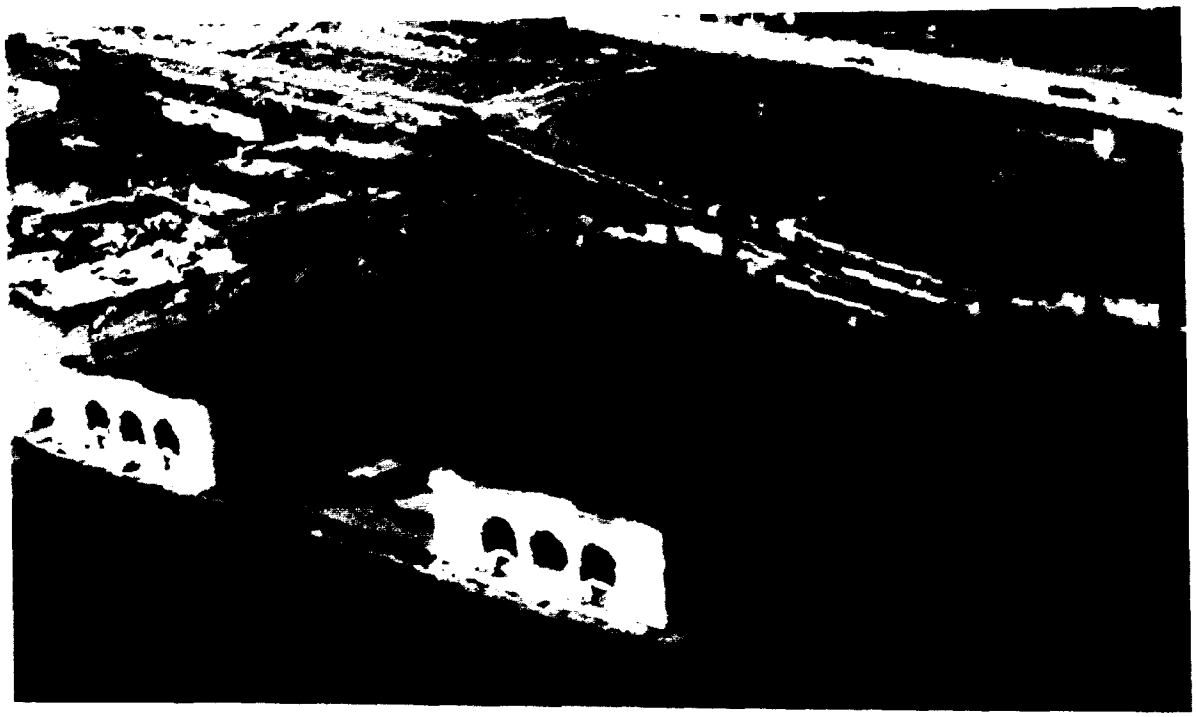
PIERS 38/40 RE-USE PLAN



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Pennsylvania Coastal Zone Management Program

PIERS 38/40 RE-USE PLAN

DECEMBER 31, 1995

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A REPORT OF THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION TO THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION PURSUANT TO NOAA AWARD NO. NA47OZ0248

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INTRODUCTION

The Piers 38/40 complex is currently leased to Penn Warehousing and Distributing, Inc. and used as a warehouse for imported paper from Europe, as well as for paper imported via ship from Canada and for some domestic paper. The imported paper from Europe is received at Pier 80 and then trucked to Piers 38/40 for storage. The paper is used locally, as well as distributed throughout the eastern and Midwestern United States, both by truck and rail.

The Philadelphia Regional Port Authority is currently considering the construction of a new paper warehouse located adjacent to the current paper facilities at Piers 78/80 and 80A. The new facility under consideration consists of 139,000 sq.ft., which will provide a yearly capacity of about 425,000 tons per year.

With the construction of this new proposed facility, it will no longer be necessary to use Piers 38/40 for warehousing, and, as a result, it is necessary to identify alternative uses for Piers 38/40. It is the purpose of this analysis to identify new opportunities for this facility, and to further develop the required capital improvements and modifications to Piers 38/40 to accommodate the identified market opportunities. The consulting team of Moffatt & Nichol Engineers, Martin Associates, Orth-Rogers Associates, and Harold E. Hall & Associates was retained by the Philadelphia Regional Port Authority to evaluate the potential uses of Piers 38 and 40, and to develop conceptual designs and associated capital costs for each alternative.

In the balance of this report, the existing conditions of the Piers are first evaluated. Next, the potential re-use opportunities are identified and evaluated. Potential traffic impacts on Columbus Boulevard are then addressed. For each opportunity identified, conceptual designs are developed along with associated costs. Finally, the financial implications of the re-use opportunities are presented.

I. EXISTING CONDITIONS

1. Background Information

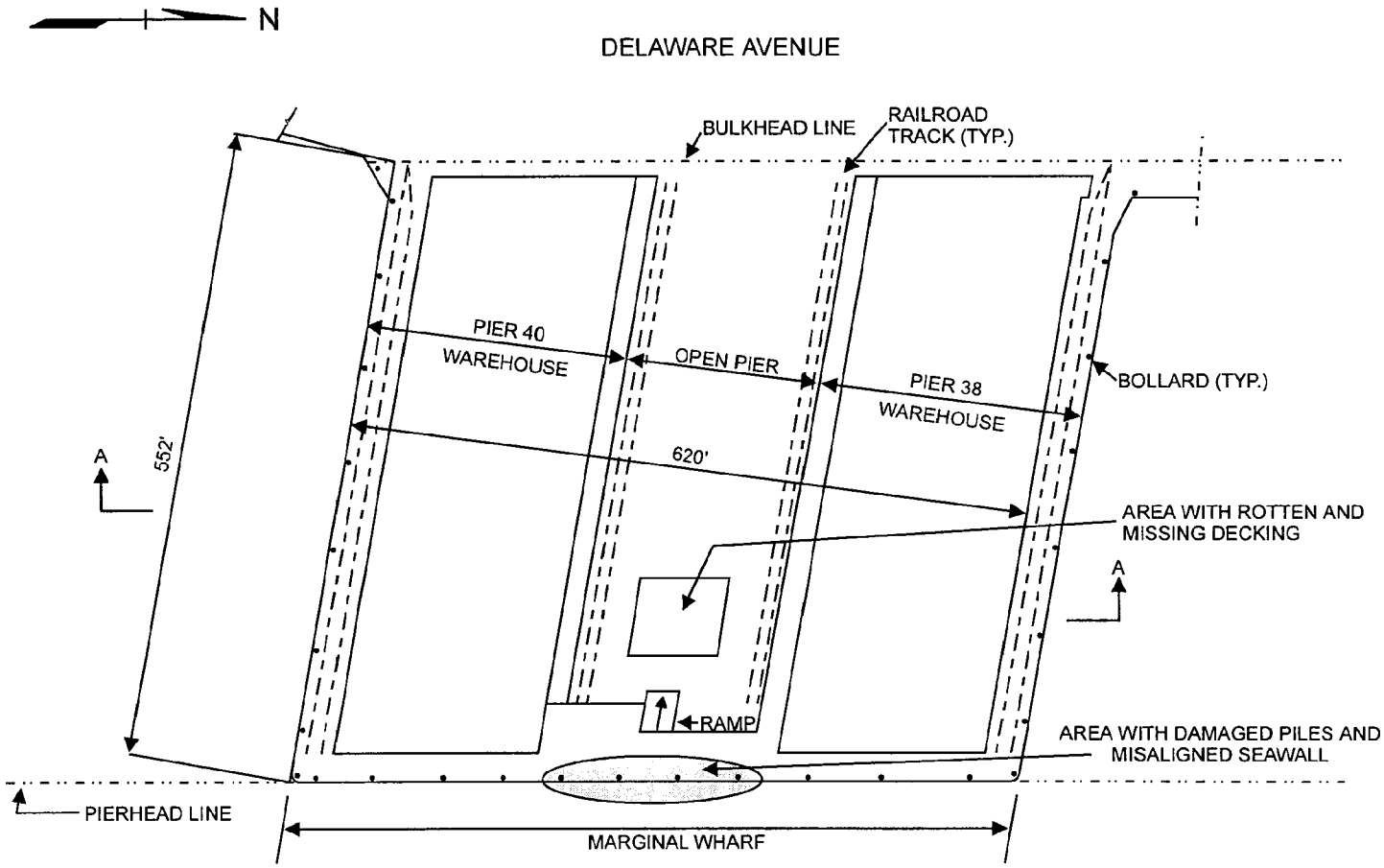
Piers 38 and 40 originally consisted of two timber pile supported reinforced concrete deck pier structures constructed circa 1912. The apron along the pierhead consisted of a timber pile supported timber deck with earthen fill above it and concrete perimeter retaining walls. In 1956, a timber supported apron was constructed on the upriver face of Pier 38 and the downriver face of Pier 40 and the area between the piers was filled with a timber supported platform. The 1956 construction consists of timber pile supported timber decking which supports earthen fill, and is topped by a concrete deck. There are perimeter concrete retaining walls to retain the fill. The perimeter wharf apron elevation is approximately +12.75 along the face of the warehouse structures and +11.75 along the face of the pier. The elevation of the area between the piers is approximately +9.00. This area is referred to as the open pier. The open pier is 3'-9" below the elevation of the loading dock which extends along the length of both building structures on the pier. The elevated portion of the open pier extends inland approximately 85 feet from the face of the wharf apron and its interior limit follows the pierhead line. There is a 40 foot long ramp to gain access from the higher elevation of the apron to the lower elevation of the open pier.

The buildings on the piers were originally constructed circa 1912. They are both two level steel framed buildings with concrete encased steel end walls. The footprint of each building is 170± feet by 525± feet with the waterside face of the building extending an additional 34 ± feet to the east, along the pierhead line. The first floor has a clear height of approximately 22 feet and the second floor has a clear height of approximately 15 feet. Each building has four structural bays across the width which are 42 feet wide in the interior bays and 43 feet wide in the exterior bays. There are 26 standard longitudinal bays, 20 feet long, with some special bays along the pierhead end of the building. The north and south elevations were originally steel veneer with roll-up doors. Cargo hoist

steel framing along the north and south facades projects 25 feet above the roof line. The east and west elevations have decorative concrete facades which extend approximately 45 feet back along the side elevations. The west elevations are on the street side of the buildings and have arched entrances originally designed for train, vehicular and human access into the building. These entrances were equipped with roll-up doors or man doors, as required. The track pit was located along the centerline of the building with vehicular ramps on either side of the tracks. The first floor was paved with a vitrified block floor. The second floor and roof deck are of concrete construction. The buildings were equipped with 4 platform elevators and 2 package elevators in addition to several stairs. The original construction documents do not indicate any heating or cooling systems for the buildings. There are some ventilation features designed into the window areas of the building walls. The roof was equipped with a series of skylights and the second floor had light wells which corresponded to the center skylight locations. There are a series of hatches in the second floor as well. Exhibits I-1 and I-2 provide a plan and cross section of the existing structures.

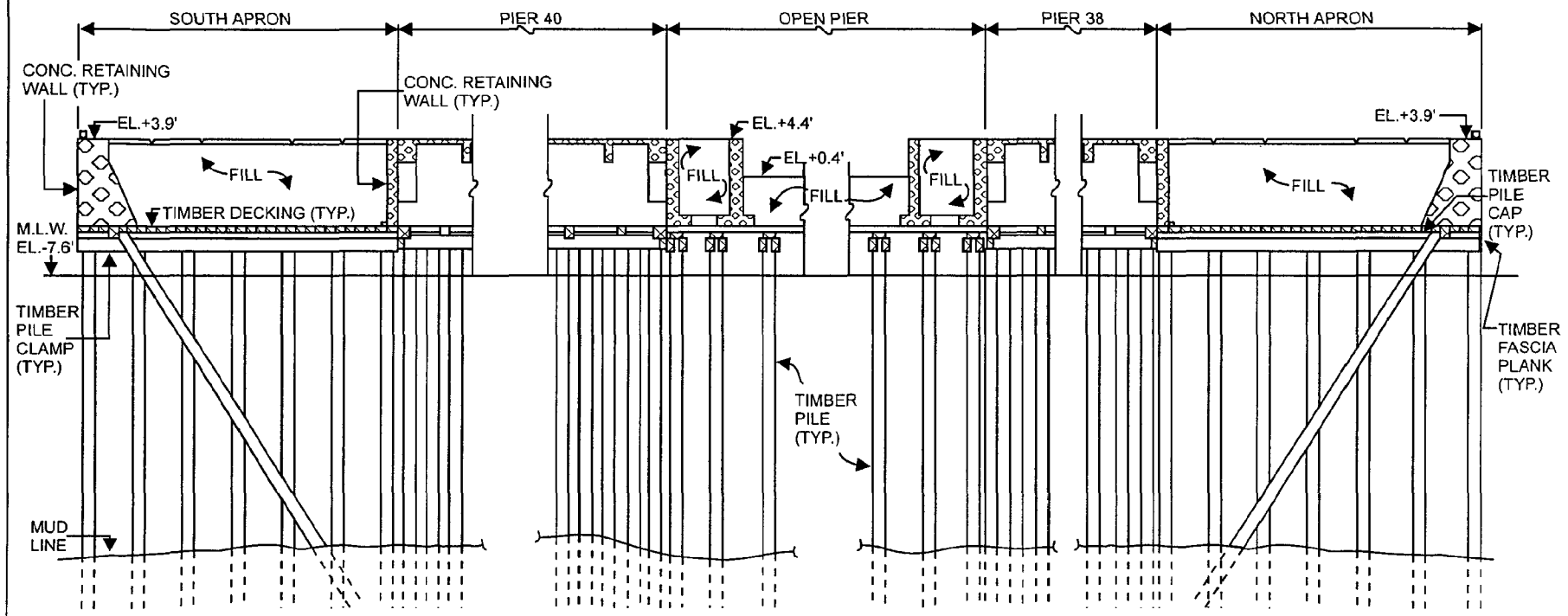
2. Facilities Inventory

A physical evaluation of building facilities was conducted for the Philadelphia Regional Port Authority (PRPA) in 1994 by O'Donnell & Naccarato, Inc. (O&N) which included the warehouse structures on Piers 38 and 40. O&N performed a detailed review of each building with respect to architectural, structural, mechanical, plumbing and electrical systems and prepared budget estimates of the cost to upgrade the condition of these facilities for safe conditions meeting building code. The general overview of the buildings prepared by O&N, and verified by a cursory inspection performed by Moffatt & Nichol Engineers (M&N), indicates that the buildings are in disrepair and show evidence of neglect. The roofs are in poor condition, with soft areas, blistering and cracks in the roofing membrane. The exterior doors and windows are broken and/or repaired in an inconsistent manner allowing for leakage. The paint on the exterior steel and cargo masts has a poor appearance. The surrounding paved areas, sidewalks, loading docks and curbs are in disrepair and the concrete is spalling. The interior steel is in need of painting and cleaning. The stair towers are not enclosed and the toilet facilities are in disrepair. Interior doors and hardware are also in poor condition. The



PLAN
N.T.S.

EXISTING CONDITIONS
PIERS 38-40 REUSE PLAN
PHILADELPHIA REGIONAL PORT AUTHORITY
DECEMBER 1995 EXHIBIT I-1



SECTION A-A
N.T.S.

EXISTING CONDITIONS
PIERS 38-40 REUSE PLAN
PHILADELPHIA REGIONAL PORT AUTHORITY

DECEMBER 1995 EXHIBIT I-2

overall structural integrity of the buildings appears to be generally sound, except for the east and west concrete end walls, which are cracked. The mechanical, electrical and plumbing systems are generally in poor condition. The warehouse spaces are neither heated or cooled and do not have ventilation systems. The buildings have City certified sprinkler systems. The buildings are not in compliance with the Americans with Disabilities Act (ADA).

Specific architectural and code related problems were delineated by O&N and are restated below. Furthermore, they noted that because of the location of the two piers adjacent to Penn's Landing and the planned River Walk, the buildings' exterior appearance should be upgraded.

Pier 38. Deficiencies specific to Pier 38 include cracked and spalling exterior and interior concrete slabs, uneven wooden block floors, cracked and spalled concrete soffits, and a poor electrical power distribution system.

Pier 40. The general condition of Pier 40 is very similar to Pier 38 as described above. In addition to the deficiencies described above, the toilet facilities are in poor condition.

Open Pier. The paved area between the two piers is spalled and cracked. The condition of the timber decking below the paved area is described in the "South Wharves on the Delaware River" prepared by S. T. Hudson Engineers, Inc. (STH) dated August 23, 1994. This pier survey report indicates that the timber low deck area between the two piers has " localized areas of rotted deck timber and the diver observed fill washing out of the openings" left from the loss of deteriorated timber decking "concentrated between Stations 3+00 and 3+50 and from 100' to 150" inshore from the face". The survey goes on to state that "typically, the condition of the deck timbers within this area show signs of moderate rot. Deck timbers were probed one to two inches in depth."

The timber decking of the open pier consists of 6"x12" decking. Probes of one to two inches indicate a sectional loss greater than 20 %, which is standard for determining that the timber has lost its structural integrity. M&N considers the condition of the decking in the specific area as described in

the STH report, to be poor. In Section III - Conclusions and Recommendations, of the STH report, the condition of "the remaining areas of decking were found to be in good condition." Without further investigation, however, there is no way to determine the extent of deterioration beyond the area of investigation which was inspected "up to 175 feet inshore from the outshore face" of the pier. This report is to determine the feasibility of reusing the existing facilities for another maritime purpose. Therefore, for the purposes of estimating costs to repair the open pier decking, it will be assumed that the extent of the timber decking requiring replacement is limited to the 100 foot square area described in the STH report as losing fill. The STH report indicates that the decking along the wharfs is in good condition.

It is strongly recommended to have an additional underwater condition survey conducted to determine the limits of the rotten and deteriorated decking more thoroughly and to extend farther inland than the survey conducted by STH. As stated earlier, probes of one to two inches into the decking indicate that there is a loss of the structural integrity of the timber decking below the open pier. Based on the information provided in the STH report regarding the conditions of the existing open pier substructure, consideration should be given to severely restricting any live load on the open pier structure in the area above where the deficiencies have been described by STH, until such time that the entire substructure is further investigated, analyzed and subsequently rated for capacity. It would also be prudent to limit the allowable live loads on the areas adjacent to those where deteriorated or missing decking has been found, to reduce stresses on members adjacent to those that are deteriorated.

Seawall. The concrete seawall along the southern face of the open pier was reported to be " in fair to good condition" in the STH report, with one area "between Stations 2+73 and 3+34 ... in poor condition". The STH survey indicates that there are 34 timber bearing piles along the perimeter of the low deck platform which are broken, missing or split. Of these, 31 are in the first (most exterior) row and 3 are in the second row. A concentration of these piles is found in the area between Stations 2+73 and 3+34 and "it is obvious that the misalignment and deflection of the seawall .. is attributable to the concentration of first and second row bearing piles which are either broken or missing in this

area." It should be noted that the piles are spaced at approximately 5 foot intervals under the entire structure, so the number of broken piles represents a small percentage of the total amount of piles. The survey states that "it is imperative that underpinning of this section of the structure be effected as promptly as possible in order to deter any further vertical deflection. Continued settlement of the wall could result in a partial collapse at this location." The STH report indicates that the remainder of the piles are in good condition, however, there is no indication of the depth of probe penetration into these piles. Probe penetrations of the existing piles will be necessary to determine the remaining pile integrity. This is an important factor for pile capacity analysis to determine future allowable loads which must be incorporated into the final design of any reuse plan. In the meantime, it is strongly recommended to severely limit or restrict the allowable live loads on the pier in the areas above and adjacent to the broken and missing piles until the piles are replaced.

Concrete Substructure. The other significant condition reported by STH is that "the underside of the reinforced concrete high deck slab was observed from the low water elevations. The underneath of the deck beams are severely spalled with exposed reinforcing steel." In Section III of the STH report it is stated that "the reinforced concrete high deck is in good condition with localized areas of spalled concrete and exposed rusted reinforcing steel bars along the under side of the deck. We conclude that no repairs are required at this time. We do, however, recommend future surveys (every two to four years) to monitor the condition of spalled areas." This condition indicates that there is loss of the structural integrity of the high deck structure. The observation does not indicate the extent or the exact location of the deficiency. Even though it is reasonable to expect that if a specific condition is observed in one area of existing construction that the same condition would be observed elsewhere, provided the construction is of the same age and type, repair recommendations cannot be made without further investigation or clarification. It is not obvious from the divers report whether the wharf area only or the high deck under the buildings was observed. In either case, further investigation is strongly recommended and, more importantly, loading restrictions should be considered for the specific area where deteriorated conditions were observed. Further investigation into the substructure of both the wharf area and the building floors is strongly recommended. Based on the information provided in the STH report regarding the conditions of the existing structure,

M&N recommends that consideration be given to limiting the live load on the structures until such time that they are further investigated, analyzed and subsequently rated for capacity because of the potential for structural failure. It is also recommended that, until such time that these investigations can be performed, the facilities be monitored to look for any evidence of subsidence or open cracks in the paving, floor slabs or other members which might indicate pending failure of the structure.

3. Conclusions and Recommendations

M&N has reviewed the pier survey report by STH. The report indicates specific areas with structural deficiencies in the timber decking supporting the open pier structure as well as the reinforced concrete high deck. These areas are deficient and should be restricted until repairs are implemented. The report indicates that "the remaining areas of decking were found to be in good condition," but the entire timber decking area was not inspected. With respect to the reinforced concrete high deck, STH concludes "that no repairs are required at this time", however they recommend monitoring "the condition of the spalled areas". M&N's experience has been that if there is a problem or deficiency in one area, there are often problems in adjoining areas. Since we have neither inspected or evaluated the structures in their current condition, we cannot render an opinion as to their condition or capacity. Therefore we cannot recommend that conclusions other than those formulated in the STH report be taken into consideration. We do, however, urge caution in continued unrestricted use of the facility until an investigation is performed. From this investigation, analyses and recommendations can be made as to the remedial work required; until such time this work is performed, it would be prudent to follow the recommendations of STH.

A new fender system should be installed to protect from future damage to the perimeter piles along the marginal wharf. Based on the probable future use, a proper fender system can be designed. It is recommended to use a system which utilizes fender panels which are sized based on the hull pressure of the ships using the wharf. The fender panels could be spaced at approximately 40 foot intervals to accommodate the range of vessels expected to use the marginal wharf and would act to protect the central portion of a cargo ship from damaging the piles at low water situations. A

complete analysis of the structural capacity of the new and/or existing timber piles will be necessary as part of the fender design. For the purposes of this report, the lateral capacity of the pier was determined assuming the pier has its original capacity. This very optimistic approach resulted in the design of 30 foot square fender panels at 40 foot intervals along the central portion of the marginal wharf. This was used as the basis for the construction cost estimate for a new fender system.

The cracked concrete exterior paving appears to be only superficial in nature and should be repaired if it presents a safety hazard or is required by the future user as part of his operation. In the areas where rotten timber decking has been found, the concrete paving will have to be replaced during the construction required to replace the timber decking areas beneath it.

4. Summary of Required Remediation for Code Compliance

The building deficiencies include mechanical, electrical, life safety, access and emergency systems and must be addressed to comply with current codes and standards. Therefore, the cost estimates associated with each re-use scenario will include repairs to the substructure and upgrade of the buildings to meet current building code and standards. It is assumed that the sprinkler system is still to City standards but should be replaced as directed by the O&N report. The cost estimates provided in the O&N report will be utilized to provide the costs to bring the buildings up to code. M&N has prepared an estimate for repairs to the open pier, piles and substructure with the exception of the remaining timber decking and the concrete substructure under the buildings for which there is no available information. No estimate can be made for this work without such information, and furthermore it must be stressed that there is a very real possibility that significant structural deficiencies exist below the pier structures that will require repair prior to re-use of the structures for an industrial use. The structural repair estimates will be included in all scenarios as the minimum work required for any re-use plan of the facilities at Piers 38 and 40.

II. MARKET ANALYSIS

In this chapter, potential re-uses of Piers 38/40 are identified based on an assessment of potential breakbulk markets in which the Port of Philadelphia can compete. To identify potential uses of Piers 38/40, Martin Associates reviewed Journal of Commerce, "PIERS" data to identify any major breakbulk commodities that were moving to and from shippers/consignees in the Philadelphia hinterland via other ports such as Baltimore, Wilmington (DE), Norfolk/Hampton Roads and New York. Major shippers and consignees handling these breakbulk cargoes were then interviewed to determine port selection criteria.

The key market opportunities initially identified are:

- Imported paper, which is currently handled at the Port of Philadelphia and stored in Piers 38/40. Philadelphia has established itself as one of the leading paper import gateways, and an understanding of the outlook for this market is necessary in order to determine if Piers 38/40 will be required in the future to handle the paper import trade.

- Cocoa beans now moving to confectionery manufacturers located in Pennsylvania, Illinois, Wisconsin, and New York. These beans are currently moving through the facilities leased from the Philadelphia Regional Port Authority and the South Jersey Port Corporation's facilities in Camden, as well as through the Virginia Port Authority's facilities in Newport News, Hampton Roads, and Norfolk, and through the Port of New York and the Port of Albany.

- Brazilian pulp imports moving through the Port of Baltimore and destined for consignees in Wisconsin, Pennsylvania and New Jersey.

- Export pulp now moving via such ports as Wilmington, NC

- Imported rubber handled at the Virginia Port Authority for tire producers located throughout the United States.

- A container freight station (CFS) where consumer goods could be consolidated into container loads to be carried as back-haul cargo on the paper ships delivering paper from Europe and Scandinavia.

Two non-commodity market opportunities were also evaluated:

- The establishment of a portion of the facility as a metals exchange, where metals traded on the London Metals Exchange could be stored.

- A cruise terminal, which could also be combined with the use of the facility as a cocoa bean and metals exchange facility.

In the remainder of this chapter each opportunity is discussed.

1. Imported Paper

The Port of Philadelphia has established itself as a premier paper import port, handling more than 50% of the paper imported by North Atlantic ports. Other ports handling the paper imports on the North Atlantic are New York, Baltimore, New Haven, and New London. Exhibit II-1 shows that the volume of imported paper handled at Philadelphia fell from 1988 through 1991, and the share of imported paper handled at the Port of Philadelphia fell to about 40%. However, after trade restrictions were lifted on imported paper, tonnage and market share increased substantially through the Port in 1993 and 1994.

The majority of the paper now imported through the Port of Philadelphia is controlled by three importers:

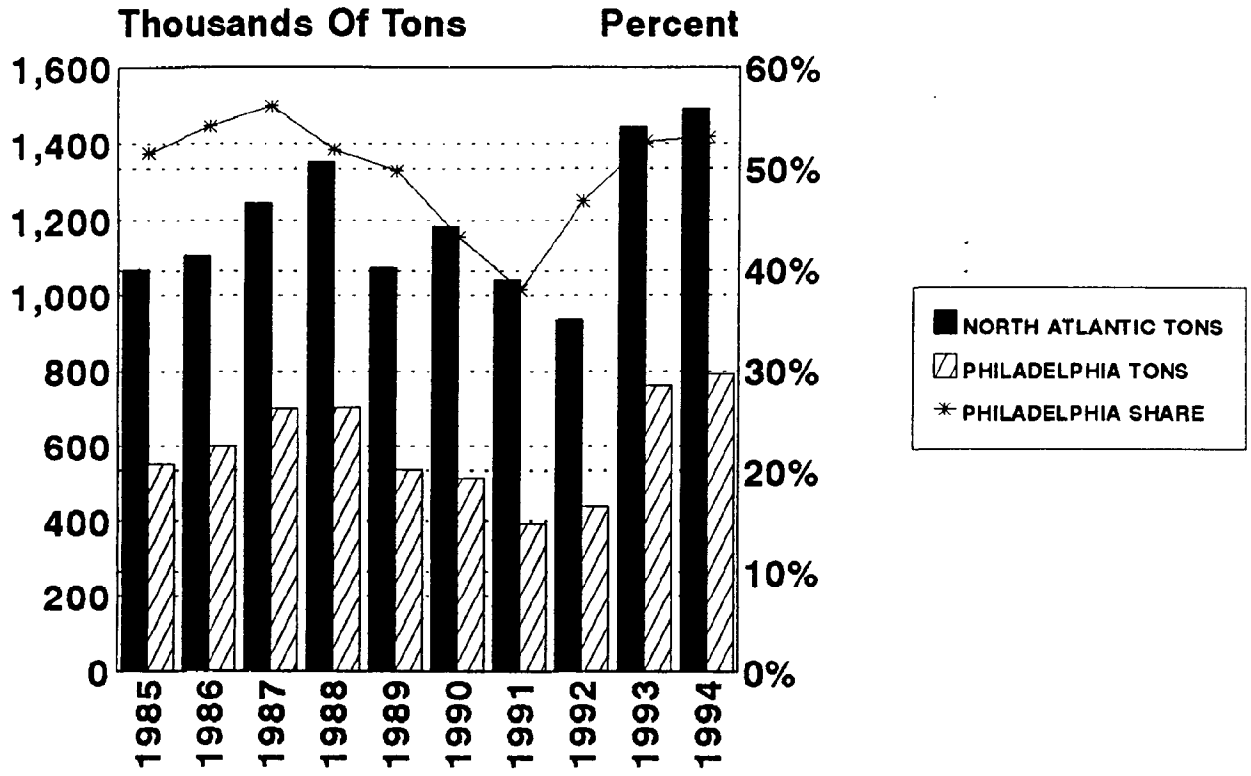
- Madden
- Kymmene
- Enzo

These three importers controlled 85% of the 792,100 tons of imported paper handled by the port in 1994. Other importers include:

- Central National Gottesman
- The Philadelphia Inquirer/Knight Ridder
- Norske Skog
- SCA Graphics
- Feldmuehle
- Perkins Goodwin
- R.R. Donnelley
- Mckeon Paper
- W.W.F. Paper

Interviews with each of these importers identified an additional 158,000 tons of paper will likely be handled at the Port in the near term. This increase results from the addition of new capacity by one of the major importers, as well as increased production by another key importer. Also, a third importer, currently not one of the top three, indicated that new tonnage will be moved through the Port of Philadelphia as a result of the diversion of current imports from a Gulf Coast Port to Philadelphia, and the addition of new tonnage to serve a market previously served by a competitor.

Exhibit II-1
Paper Imports at the Port of Philadelphia



In the near term, paper imports are projected to reach 950,000 tons, and assuming a 3% annual growth rate, paper import tonnage at the Port of Philadelphia will likely reach 1.1 million tons. These forecasts of paper import tonnage are consistent with the 970,000 tons projected by the PRPA in the Physical Plant and Paper Handling Operations Study[1]. Based on the analysis in this O'Donnell & Naccarato report, it would appear that the new paper warehouse planned at the Piers 78A and 80 complex will be adequate to handle this future tonnage, and, hence, Piers 38/40 will not be needed given the construction of a new warehouse.

2. Cocoa Beans

The Port of Philadelphia has historically been a major import port for cocoa beans, which were consumed by the confectionery manufacturers located within the Commonwealth, particularly in Hershey, Elizabethtown and Lititz, Pennsylvania. Exhibit II-2, on the following page, shows the location of the major confectionery manufacturers with respect to the Port of Philadelphia. This exhibit indicates that the Port of Philadelphia represents the closest port for the majority of the confectionery manufacturers.

Exhibit II-3 shows that in the early 1980's, the Port of Philadelphia handled more than 50% of the cocoa beans imported into the United States. This share dropped to about 15% by 1991 and 1992, as the Virginia Port Authority dominated the cocoa bean import market with the availability of on-dock bean storage. This concept of on-dock storage reduced costs of handling and storing the beans significantly, and provided a cost effective alternative to the Port of Philadelphia, which had experienced problems with facilities, as well as labor costs, during the mid to late 1980's. However, through aggressive labor concessions and improved on-dock facilities, the Ports of Philadelphia and Camden are regaining market share. By 1993, the port facilities at Philadelphia and Camden handled about 25% of the beans imported into the United States. The share fell slightly in 1994, as did overall bean import volume.

To identify the potential to increase the cocoa bean throughput at Philadelphia and to assess the compatibility of Piers 38/40 for use in the cocoa bean market, Martin Associates interviewed the following importers, brokers and manufacturers:

- EDF Mann
- Cargill
- Chadler, USA
- Blommer Chocolate
- Grace Cocoa
- Hershey Chocolate
- Nestle's
- Wilbur Chocolate

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[1] "Study Summary, Recommendations and Budgets," Physical Plant and Paper Handling Operations Study, for the Philadelphia Regional Port Authority, prepared by O'Donnell & Naccarato.

- M&M Mars
- Dependable Distribution
- CICT
- Cocoa Merchant Association

Interviews with the local cocoa bean importers in the Philadelphia and Camden area indicated that currently there exists about 1.3 million sq. ft. of storage:

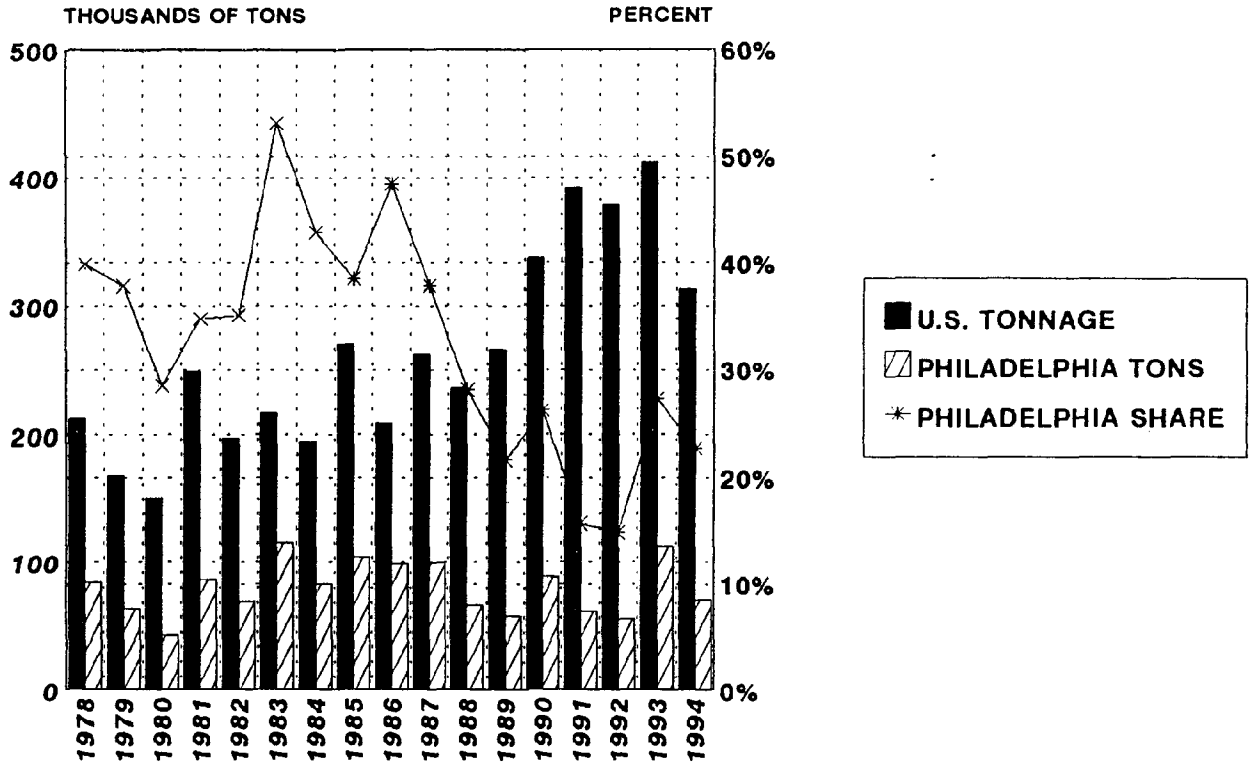
- 500,000 sq.ft. at Pier 84 in Philadelphia
- 300,00 sq.ft. at the Beckett Street Terminal in Camden
- 500,000 sq.ft. in Pennsauken

Exhibit II-2
Location of Cocoa Bean Manufacturers

COMPANY	CITY	DISTANCE FROM PORT (MILES)
BLOMMER CHOCOLATE	SAN MATEO, CA	2871
GHIRADELLI CHOCOLATE	SAN LEANDRO, CA	2865
GUITTARD CHOCOLATE	BURLINGAME, CA	2880
HERSHEY FOODS	OAKDALE, CA	2857
NESTLE	SALINAS, CA	2911
GENERAL FOODS	DOVER, DE	74
LONRAY	SAVANNAH, GA	693
BLOMMER CHOCOLATE	CHICAGO, IL	742
BRACH	CHICAGO, IL	742
LEAF CONFECTIONARY	BANNOCKBURN, IL	742
WORLD'S FINEST CHOCOLATE	CHICAGO, IL	742
MERKENS CHOCOLATE	MANSFIELD, MA	288
AMBROSIA CHOCOLATE	NEWARK, NJ	82
BARRY CHOCOLATE	PENNSAUKEN, NJ	5
GILL & DUFUS PRODUCTS	GLASSBORO, NJ	23
VAN LEER CHOCOLATE	JERSEY CITY, NJ	88
COCOA LINE	BROOKLYN, NY	106
NESTLE FOOD CORP	FULTON, NY	275
CADBURY SCHWEPPS	TORONTO, OT	459
HERSHEY FOODS	SMITH FALLS, ONT	403
BLOMMER CHOCOLATE	E. GREENVILLE, PA	36
HERSHEY FOODS	HERSHEY, PA	94
M&M MARS	ELIZABETHTOWN, PA	81
WILBER CHOCOLATE	LITITZ, PA	71
NILSON CHOCOLATE	MONTREAL, QUE	447
AMBROSIA CHOCOLATE	MILWAUKEE, WI	828
NESTLE	BURLINGTON, WI	812

This represents about 800,000 sq.ft. of on-dock or near dock storage in the Philadelphia area. Currently, this capacity is not fully utilized, averaging about 65% of capacity utilization. The ability to use on-dock storage reduces the cost of importing cocoa at Philadelphia by about $5 per ton, as drayage from the piers to off-dock warehouses is eliminated.

Exhibit II-3
Cocoa Bean Imports at the Port of Philadelphia



SOURCE: COCOA MERCHANT ASSOCIATION

Currently, cocoa beans are imported into the United States in bags of about 140 pounds. The majority of the beans are imported in breakbulk form, while a smaller share of the beans are imported via bolsters or containers. At the marine terminals in Philadelphia and Camden, Pier 84 can only handle breakbulk cargo, since the apron width is not properly configured to handle containers and shoreside cranes. However, containerized cocoa beans can be imported at Packer Avenue and South Jersey Port Corporations's Beckett Street terminals.

Based on the interview results, the trend in cocoa bean imports is to deliver the beans in bulk form or in super sacks (bags of one ton) to the manufacturers. The terminals are becoming integrated with the manufactures' logistics systems. For manufacturers that have sufficient silo storage capacity, delivery in bulk form is preferred, while for manufacturers with limited storage capacity, the super sack has become the preferred method over the receipt and storage of cocoa beans in bags of about 140 pounds.

The preferred method by the importers and manufactures is to source-load containers in bulk, and deliver the bulk containers directly to the manufacturer under a "door to door" intermodal rate. However, this requires very strict quality control measures at the port of loading, and further requires the ability to control the humidity of the beans within the containers while in transit. Neither of these key factors has been perfected to date. In Europe, beans are delivered in bulk containers to customers, after the beans are debagged at the port of discharge.

Within the United States, the first degree of bulk bean delivery is the receipt of the bagged beans (140 pound bags) at the port, either in breakbulk form or in containers. The beans are debagged at the port, reloaded in bulk trucks or reloaded in super sacks. By reloading the beans in super sacks or food quality-trucks at the port of entry, the manufacturer or importer can accept or reject the beans prior to its arrival at the plant. By using the warehouse and debagging facilities at the port, investments in silos at the manufacturing plants are reduced. However, the debagging and reloading of the beans at the port of entry does add an additional cost that must be offset from a transportation, or value added, perspective. Such value added services at the port of entry that can be used to off-set the extra cost of debagging and then reloading into bulk trucks or super sacks include cleaning the beans, weighing, sampling, and testing the beans by the terminal operator. Most manufacturers in the United States prefer the super sacks over the receipt of beans in containers, since the containers must be stripped and returned to the port or ocean carrier in a timely manner to avoid detention charges.

The second generation of bulk deliveries is the source-loading of the beans in bulk into containers. This method of source-loading in bulk containers reduces the costs of debagging and reloading into super sacks at the port of discharge, and also will provide a through transportation cost. However, in addition to the potential loss of quality control at the source-loading port, as well as the inability to control the humidity in-transit, the receipt of bulk beans in containers at the manufactures requires investments in silos. Also, it is not possible to inspect the beans at the port of entry prior to receiving the cocoa beans at the plant.

The bean importers identified a third and highest level of value added processes that could develop

in the future. This includes cleaning and destoning of the beans at the port, super cleaning the beans to food quality, shelling the beans, storing the nibs and eventually delivering the nibs to the plant. At this third stage of value added processing, the terminal operator and port have become completely integrated into the logistics system of the confectionery manufacturer.

In order to position itself as the leading cocoa bean port, it will be necessary for the Port to offer these value added services on-dock, in order to offset drayage costs and minimize the costs of bean imports to compete effectively with source loaded, bulk deliveries at the plant. To this end, Piers 38/40, could provide the on-dock capacity for such value added operations. Piers 38/40 used as a cocoa facility would provide the following advantages for the Port of Philadelphia:

- Transfer beans currently stored off-dock to Piers 38/40. This transference would add a revenue stream to the PRPA, based on storage charges.

- Direct discharge of vessels at Piers 38/40 can be accomplished, including both breakbulk and containers. Therefore, drayage to off-dock warehouses will be eliminated. Piers 38/40 can be used for warehousing and transit shed operations, and the beans can be trucked to Pier 84 for value added processing for designated customers.

Interviews with the brokers, importers and terminal operators expressed a preference to use the Port of Philadelphia for bean imports, and this preference would increase with the availability of more on-dock storage and lower labor costs within the warehouse. Three key Pennsylvania manufacturers expressed a strong preference to begin debagging operations and bulk deliveries (either in bulk trucks or super sacks). However, it is critical that the price of the debagging and reloading operations will be more attractive than the source bulk loading.

Currently, debagging operations are in place at the Port of Albany, the RPM Terminal in Staten Island and the Continental Terminal in Brooklyn, as well as in Philadelphia.

The interviews with the brokers, importers, terminal operators and manufacturers indicated that with increased on-dock storage space in Philadelphia and growth in the debagging operations, an additional 800,000 to 1 million bags of cocoa beans could be imported via the Port of Philadelphia. The Cocoa Bean Merchants Association projects that Philadelphia could regain a 50% share of the total cocoa bean import market by the year 2000. The majority of this increase will come from the diversion of about 3 million bags of cocoa beans from Norfolk, combined with an annual growth rate of 3%. Combing the estimates of additional cocoa bean throughput from the interview results and the projections developed for Philadelphia by the Cocoa Bean Merchants Association, it is estimated that by the year 2000, and assuming a full-scale debagging operation at Pier 84, an additional 860,000 bags of cocoa beans could be imported through the facilities in Philadelphia.

While the projected levels of cocoa throughput at Philadelphia are not solely dependent upon the use of Piers 38/40 as additional cocoa facilities, these facilities would provide additional on-dock storage. It is to be emphasized that as the beans are debagged and rebagged into super sacks, more warehouse

square footage will be required as the super sacks cannot be stacked to the same height as the standard bags of 140 pounds. Furthermore, it is envisioned that only the bottom floors of Piers 38 and 40 would be used for bean storage, and the upper levels could be used for other uses such as cruise facilities and a metals exchange.

3. Imported Brazilian Pulp

The Port of Baltimore has dominated the imported Brazilian pulp market, handling about 400,000 tons of pulp annually. This pulp is, for the most part, railed to plants in Wisconsin for use in the production of paper products such as disposable diapers and feminine hygiene products.

To determine potential for the Port of Philadelphia, interviews were held with several of the key players in the pulp import market, including the importer Rio Doce, Balterm (the terminal handling the pulp in Baltimore), and Star Shipping (the specialized forest products carrier transporting the Brazilian pulp). These interviews indicated that between 1995 and 1997, 550,000 additional tons of pulp will be imported into the U.S., based on current production expansion plans in Brazil. Several ports are under consideration to handle this tonnage:

- Philadelphia
- Baltimore
- Houston
- Mobile
- New York

Key in the Port selection criteria is the need for direct rail access by more than one rail line into the terminal, and a warehouse sufficient to handle the tonnage. Further interviews with the importer and ocean carrier indicated that Philadelphia could potentially handle about 200,000 tons of this pulp, particularly due to the rail access into the Port by Conrail, CSX and the CP Railway. However, interviews with the importer also indicated that improvements in the physical condition of the warehouses would be required.

The potential for the Port is estimated at about 200,000 tons annually, and annual growth is projected at 10% for the next 5 years. Piers 38/40 are served by all three rail lines, and could potentially be used to accommodate this breakbulk pulp market.

4. Export Pulp

The market for export pulp was identified as a market for further exploration by the PRPA. Martin Associates identified key mills supplying the export market. These mills included:

- James River Corp.
- Kimberly Clark
- Kruger International

- Union Camp
- Alpha Cellulose
- International Paper
- Federal Paper
- Georgia Pacific
- Buckeye Cellulose (formerly Proctor and Gamble)
- Weyerheauser

Interviews were conducted with each mill to determine the potential for export via Philadelphia. For the most part, ports serving the export pulp market are located within less than 150 miles of the producing mills. The majority of the mills supplying the export market are located in the Southeastern U.S., and use ports such as Wilmington, NC for ports of export. The ports typically are integrated into the logistics system of the mills, and offer on-dock storage for the unitized breakbulk pulp.

One producer indicated that there might be limited market potential for Philadelphia to handle about 500 TEU's annually of pulp bound for the Australia/New Zealand Market. This could move as a backhaul on current carriers calling the Port. The specific mills supplying this market are located in:

- Erie, PA
- Lockhaven, PA
- Hamilton, Ohio
- Westfield, MA
- Androscoggin, ME

The market potential does not appear to be compatible with Piers 38/40, since the moves are containerized and would be backhaul cargo for carriers calling other marine terminals at the Port.

5. Imported Rubber

New Orleans and Norfolk are the major ports used to handle imported breakbulk rubber. Recently, Waterman Steamship added the Port of Morehead City as a port for rubber imports, primarily for rubber imported by Goodyear. To determine if the Port of Philadelphia could enter the breakbulk rubber import market, interviews were conducted with the following key rubber importers, as identified from the Journal of Commerce, "PIERS" data base:

- Lewis & Peat Rubber
- Cooper Tire & Rubber
- Goodyear International
- Bridgestone/Firestone
- Cooper Tire & Rubber
- E.P. Lambert
- Alcan Rubber

- Waterman Steamship

The importers indicated that the major consumption points for the imported rubber are in the southern United States:

- Georgia
- Mississippi
- Arkansas
- North Carolina

Inland costs to serve these production plants are key in the port selection. Because of its northern location, the Port of Philadelphia is not in a competitive position to serve the key rubber markets.

6. Metals Exchange

Another potential use of warehouse space is the designation of a portion of the Piers 38/40 area as a London Metals Exchange Depository. The London Metals Exchange is the sole non-ferrous metals exchange in existence. Essentially, metal dealers store metals on the exchange in designated warehouses currently located in the following cities:

- Baltimore (2 warehouses)
- Toledo
- Chicago
- St. Louis
- Long Beach
- Bridgeport, CT
- Detroit

Once stored in one of the registered warehouses, the dealers receive warrants for their metals. The warrants are traded on the London Metals Exchange. When the warrants are cashed-in, the metals are taken possession of, and storage costs are paid to the warehouse operator. Typically, the metals remain in storage for about 4 months, at the minimum.

When an additional metals exchange facility is deemed to be necessary, the London Metals Exchange will issue a Request for Proposal (RFP). The successful bidder then receives the official registration. Based on interviews with current metals exchange warehouse operators, this activity does not generate significant throughput at the port, but is an effective method of utilizing vacant warehouse space.

To become a registered metals exchange warehouse, the facility must be located within a Foreign Trade Zone (FTZ). Piers 38/40 would need to be included in the current FTZ jurisdiction at Philadelphia, and the Port would have to respond successfully to an RFP issued by the London Metals Exchange.

The upper floor(s) of Piers 38/40 could be used for such a metals exchange in combination with other uses of the facility, such as for cocoa beans or imported pulp.

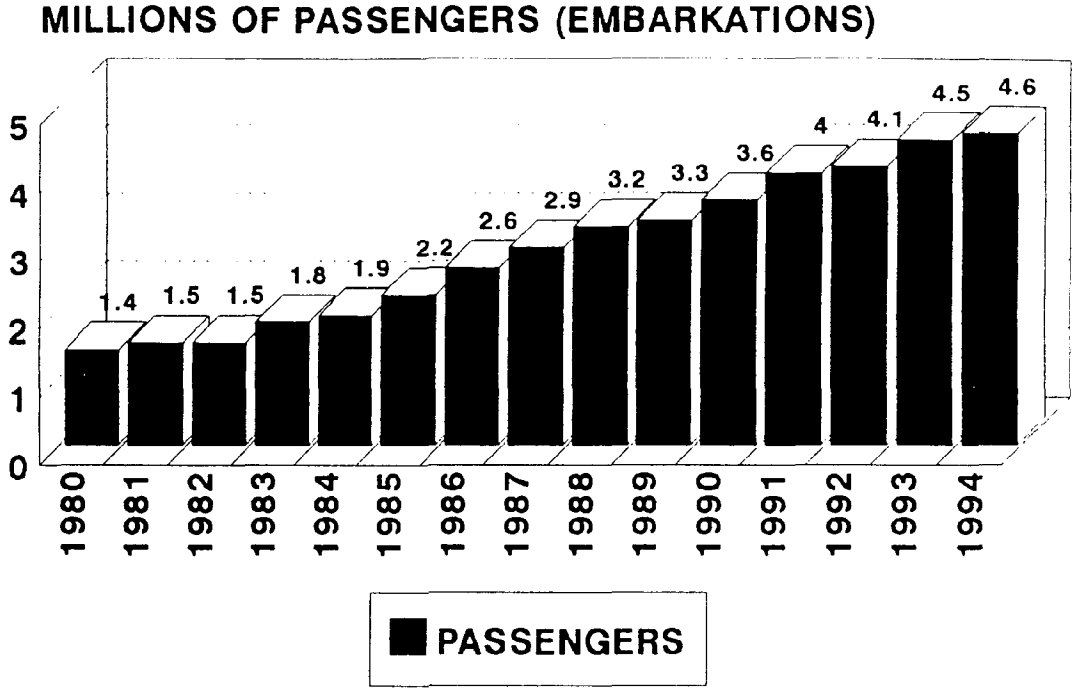
7. Container Freight Station

The majority of vessels carrying the imported paper from Scandinavia into Philadelphia return empty. A possible backhaul for these vessels is consumer products (ranging from blue jeans to appliances). These consumer products could be trucked and railed into Piers 38/40, consolidated and containerized at Piers 38/40. The stuffed containers could then be trucked to Pier 80 for loading onto the paper ships. The estimated market potential for this operation is about 15-20 containers per vessel. Piers 38/40 present an attractive facility, given the rail access as well as the limited investment that would likely be required.

8. Cruise Passenger Market

The North American cruise market has experienced strong growth over the last 15 years, averaging an annual growth rate of 9.2% between 1980 and 1994. Exhibit II-4 shows the growth in passenger embarkations in North America.

Exhibit II-4
Annual Cruise Passengers
(Embarkations)



EXCLUDES ONE-DAY CRUISES
SOURCE: CLIA

There are several types of cruises offered in the North American Market:

- Caribbean Cruises consist of cruises typically departing from a South Florida port such as Miami, Port Everglades, Port Canaveral, Palm Beach, etc. These cruises range in length from 7-10 day cruises to 3-4 day cruises. Also, some one day cruises to the Bahamas are offered out of Port Everglades and Miami. Typically, passengers fly into the port city and are transported directly onto the cruise ship. West Coast passengers generally arrive the night before the cruise, due to airline scheduling from the West Coast to the East Coast. The location of an airport close to the port with non-stop service to key passenger markets is critical to the success of the Port in attracting cruise vessel service for the Caribbean market. The vessels deployed in the Caribbean service tend to be homeported in South Florida, and offer either seasonal (October through May) or year-round service. When not deployed on the dedicated Caribbean trade, these seasonal vessels are deployed in the Alaskan trade or in the European trade.

- Trans Atlantic market consists of cruises between the Atlantic Coast and Europe, and are not as frequently scheduled as are the Caribbean cruises. These cruises often involve repositioning a vessel from the Caribbean service to the European service.

- Trans Canal cruises are cruises from South Florida Ports through the Panama Canal. These tend to be relatively long cruises and may be connected with a call at a Mexican port where passengers are discharged.

- Bermuda Cruises are cruises from North Atlantic ports such as New York, Philadelphia, Alexandria (Virginia) and Baltimore. The cruise season is limited, and is further restricted to four carriers operating 26-28 calls per year. These companies are Holland America, Royal Caribbean, Celebrity Cruise Lines, and Majesty Cruise Lines.[2] The Bermuda market is a relatively small portion of the cruise market, representing less than 3% of total North American cruise passengers.

- Fall Foliage Cruises are cruises from North Atlantic ports through the Saint Lawrence Seaway, including Nova Scotia, New Brunswick, Newfoundland, Montreal, and Toronto. The season is August to December, and this market accounts for less than 1% of the North American cruise market.

With respect to the Port of Philadelphia's potential to enter into the cruise business, the market is limited to Bermuda Cruises, fall foliage cruises and trans Atlantic cruises, due to the location of the Port of Philadelphia. For example, Philadelphia is too far north to serve the

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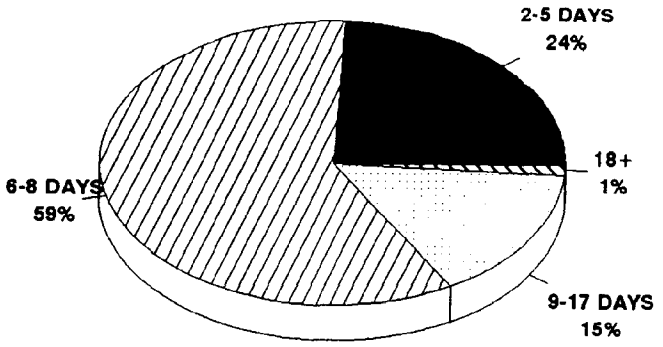
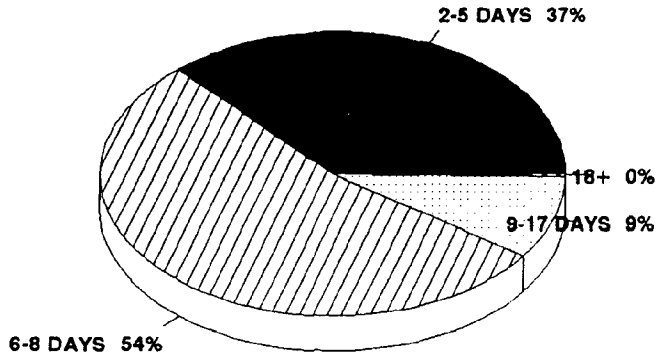
[2]Majesty Cruise Lines has recently ceased operations due to a worsening financial situation.

Caribbean market. Distance has become increasingly important as the demand for shorter cruises has increased over time. Exhibit II-5 shows the growth in the cruise passengers by length of cruise. As this exhibit shows, between 1980 and 1993, the major growth in cruise passengers has been in cruises of 2-5 days in length. The share of passengers on cruises of 9 to 17 days in length, which would be required for a Caribbean cruise from Philadelphia, has fallen from 15% in 1980 to 9% in 1993.

Exhibit II-5
Share of North American Cruise Market by Length of Cruise



1980



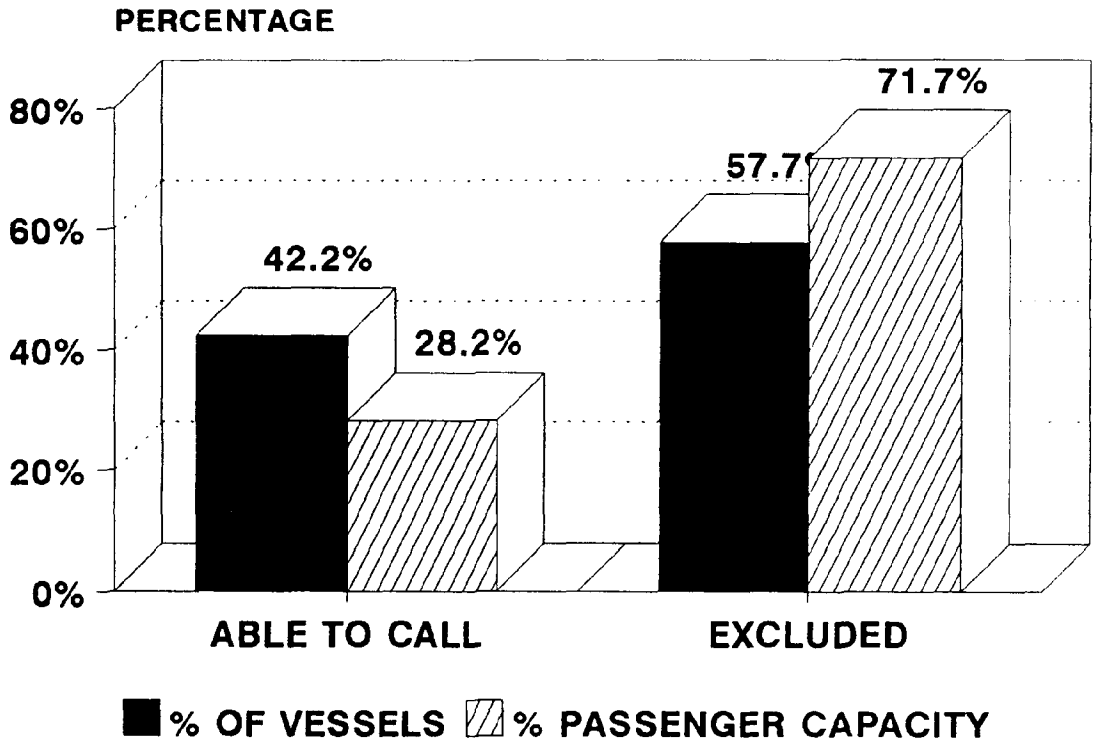
1993

SOURCE: CLIA

As a result, the Port of Philadelphia's most likely cruise markets are Bermuda and the foliage cruises, two relatively small cruise markets.

With respect to the use of Piers 38/40 as a cruise terminal, the height of the Walt Whitman Bridge may pose a problem for cruise ships. The Walt Whitman Bridge constrains the air draft of vessels to 150 feet. Martin Associates sampled the air draft of 45 cruise vessels deployed in the North American cruise markets. Exhibit II-6 shows that the 150 foot clearance of the bridge prohibits nearly 60% of the vessels from transitting under the Walt Whitman Bridge to call Piers 38/40, and more importantly, this bridge height restricts 72% of the North American cruise vessel passenger capacity.

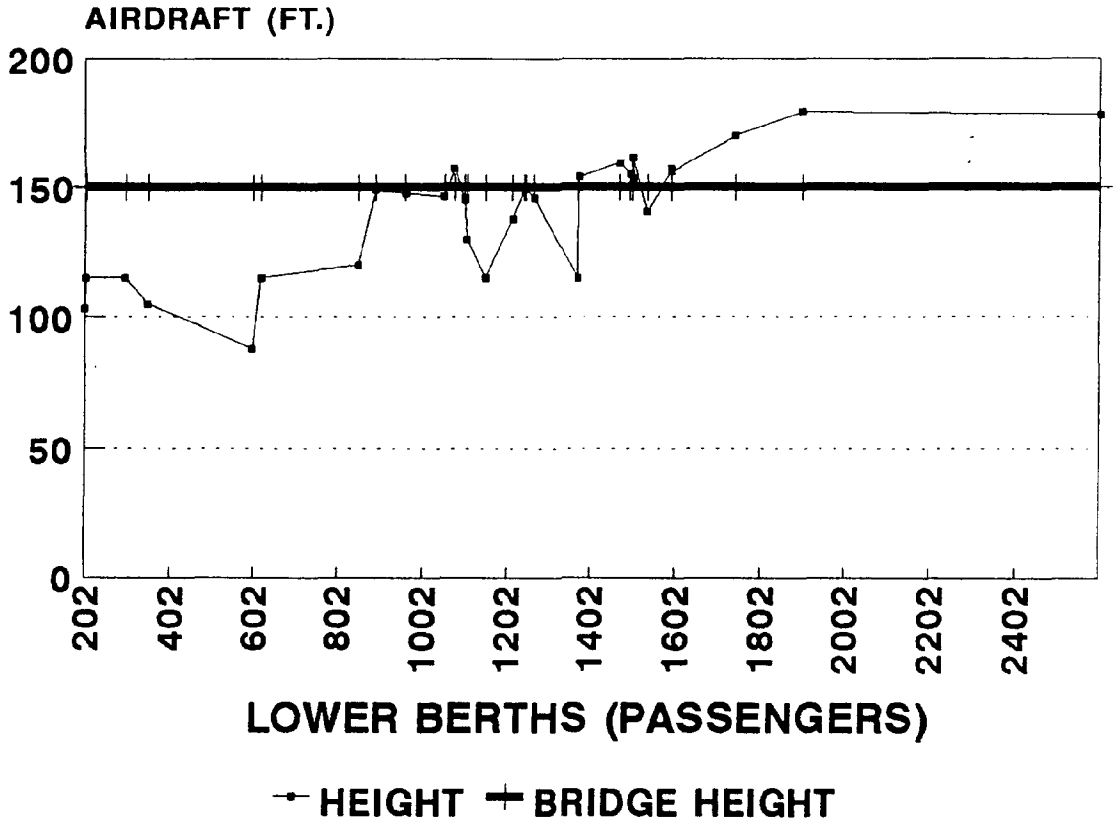
Exhibit II-6
Cruise Vessels Excluded from Transitting Under the
Walt Whitman Bridge
Number of Vessels and Passenger Capacity



SOURCE: SURVEY OF 45 CRUISE VESSELS

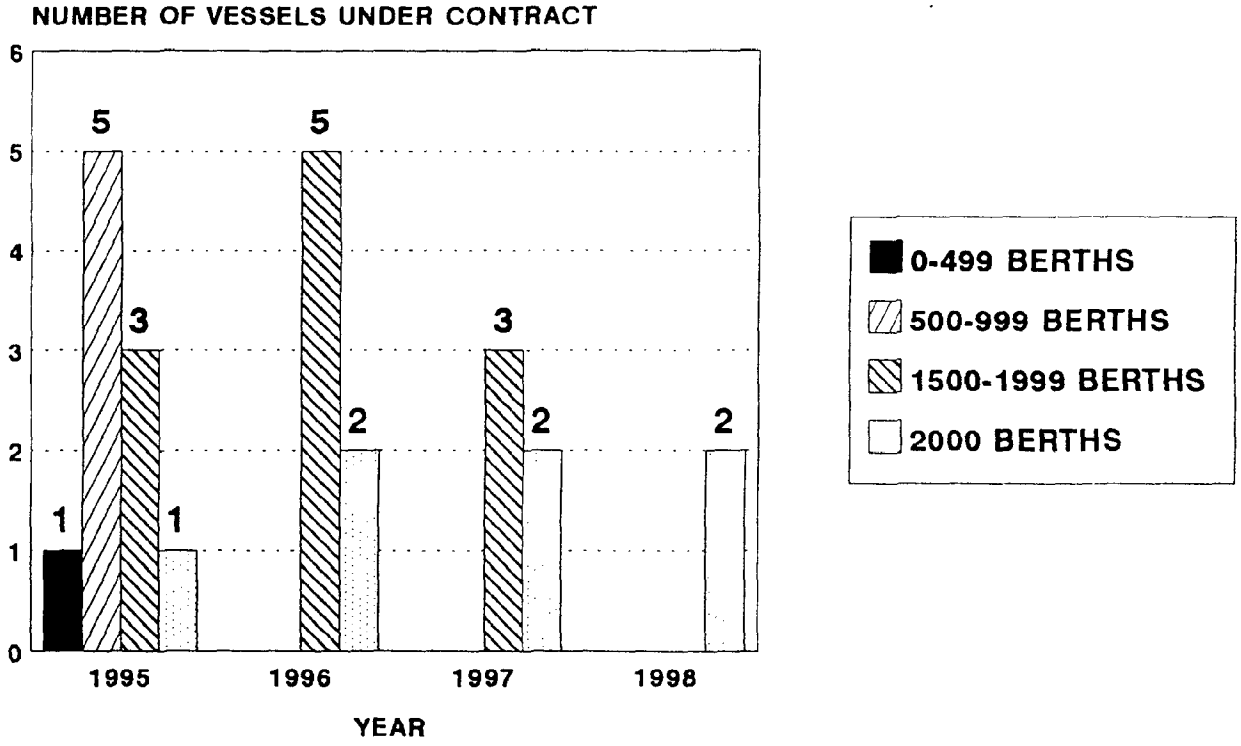
While not the case for cargo vessels, there appears to be a relationship between size (measured in terms of lower berths) and air draft of cruise vessels. The larger the number of lower berths, the greater is the air draft of the vessel. Exhibit II-7 graphically depicts this relationship.

Exhibit II-7
Air Draft Versus Lower Berth Capacity



As this exhibit further demonstrates, the larger the cruise vessel in terms of passenger capacity, the greater will be the air draft. Exhibit II-8 shows the distribution of the cruise vessels on order. Given this relationship between passenger capacity and air draft, it is to be emphasized that the majority of new cruise vessels on order are over 1500 passengers in capacity, which appears, from the previous exhibit, to be in the range of the passenger capacity which is associated with a vessel air draft in excess of 150 feet. Therefore, since the majority of the new ships on order are not likely to be able to pass under the Walt Whitman Bridge, the market for cruise operations at Piers 38/40 is limited to an even greater extent (than just by the markets).

Exhibit II-8
Distribution of Cruise Vessels On Order



SOURCE: CLIA

Based on the limited markets available to the Port of Philadelphia, and the height limitations imposed by the Walt Whitman Bridge on cruise ships calling Piers 38/40, it is estimated that about 18 cruise ships could call Piers 38/40, if the Piers were modified for passenger use.

9. Summary of Market Potential and Economic Impacts

The market analysis identified the following opportunities for the re-use of Piers 38/40 that should be further evaluated in terms of costs to modify the Piers for the specified purposes. These are:

- The use of Piers 38/40 for a combined pulp facility, passenger terminal and London Metals Exchange Warehouse

- The Development of Piers 38/40 to handle cocoa beans.

The economic impacts of each of these potential market opportunities were estimated using the Martin Associates' Port of Philadelphia Economic Impact Model, developed for the Philadelphia Regional Port Authority in 1994. Table II-1 summarizes the potential impacts associated with each of the identified potential re-uses of Piers 38/40. The impact of the use as a metals exchange is not estimated since this would entail only a warehousing function, which could be handled by those operating the cocoa bean warehouse operation.

Table II-1

Potential Economic Impacts

IMPACTS	PULP	CRUISE	PULP/ CRUISE COMBINED	CFS	COCOA
JOBS					
DIRECT	72	76	*148*	10	17
INDUCED	36	24	*60*	5	9
TOTAL JOBS	*108*	*100*	*208*	*15*	*26*
PERSONAL EARNINGS (1,000)					
DIRECT	$2,942	$1,664	*$4,606*	332	$763
RE-SPENDING (1,000)	$2,947	$1,665	*$4,612*	330	$759
TOTAL PERSONAL EARNINGS (1,000)	*$5,889*	*$3,329*	*$9,218*	*$662*	*$1,522*
BUSINESS REVENUE (1,000)	*$6,500*	*$7,996*	*$14,466*	*2,182*	*$7,622*
STATE AND LOCAL TAXES (1,000)	$436	$412	*$848*	$58	$105

As this exhibit shows, the combined use of the facility as a pulp facility and cruise facility will generate the greatest economic impact, creating 208 direct and induced jobs, $9.2 million of personal earnings and consumption expenditures, $14.5 million of business revenue, and $.9 million of state and local taxes. The use of Piers 38/40 for handling 860,000 bags of cocoa beans would generate about 26 direct and induced jobs, $1.5 million of local personal earnings and consumption expenditures, $7.6 million of business revenue, and $.1 million of state and local taxes. Finally, the CFS opportunity would likely generate the smallest economic impact.

The financial feasibility of each of these opportunities are evaluated in Chapter V.

III. TRAFFIC ANALYSIS

This chapter analyzes the traffic impacts of three alternative development scenarios at Piers 38/40. The three scenarios are:

- Wood Pulp
- Passenger Cruise Terminal
- Cocoa Beans/London Metals Exchange

The report documents existing conditions on Christopher Columbus Boulevard. The current rail and truck traffic generated by Piers 38/40 is described. Then, a section on each future scenario describes its impact on rail and truck traffic and other impacts, such as parking.

1. Description of Existing Area Road Network

Piers 38/40 are accessed via a single driveway to Christopher Columbus Boulevard. The driveway is located opposite Christian Street. The intersection of Columbus Boulevard, Christian Street and the Piers 38/40 driveway is signalized.

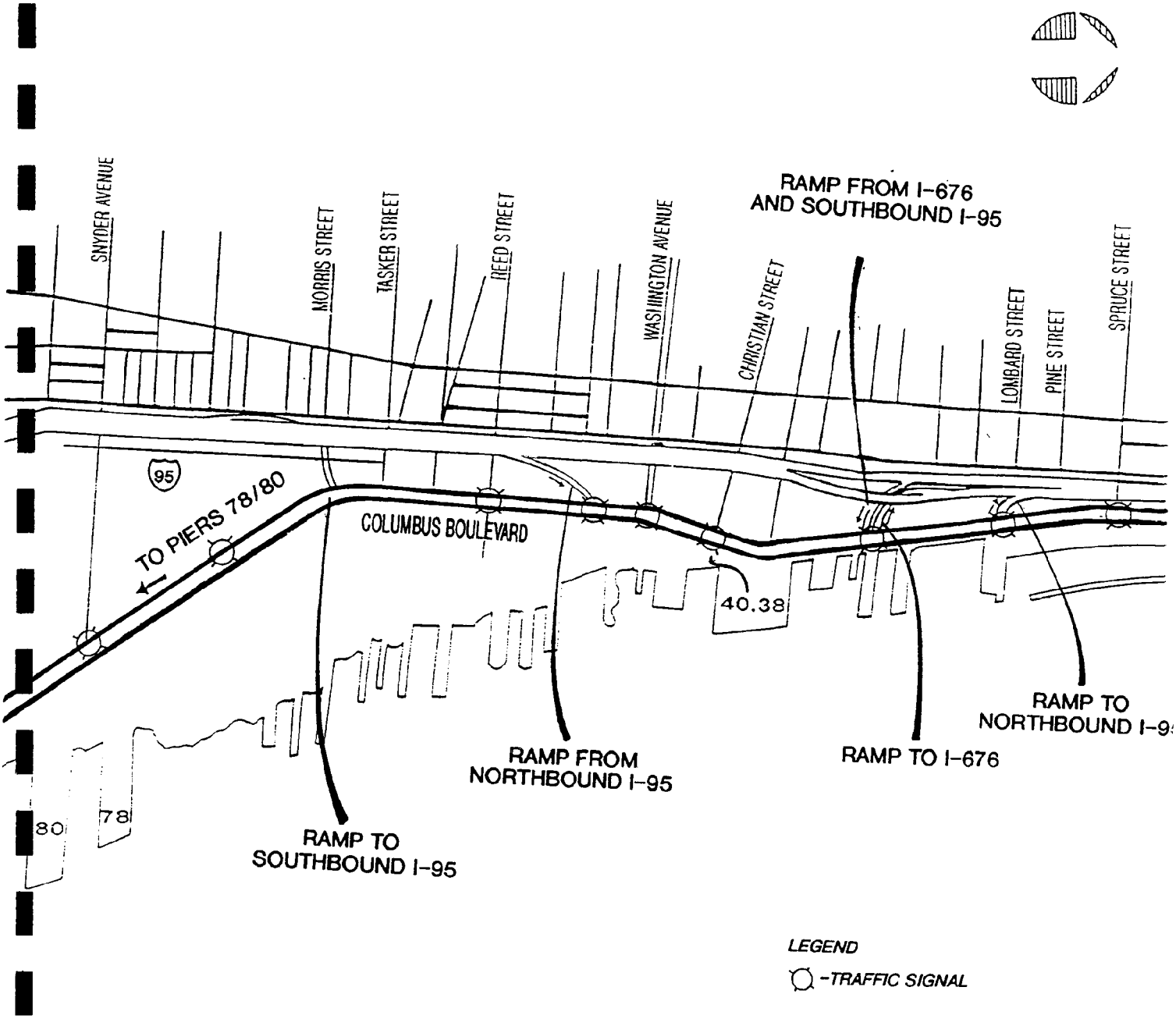
Christopher Columbus Boulevard serves as the major north-south street for traffic in the vicinity of PRPA facilities from Piers 38/40 south to the Packer Avenue Marine Terminal. At Piers 38/40, Columbus Boulevard provides three through lanes (50 foot wide) in each direction, plus separate left-turn lanes at the signalized intersections. A curbed median or concrete barrier separates the northbound lanes from the southbound lanes. A single track rail line occupies the median. Rail freight service is provided to the south and as far north as Piers 38/40. North of Piers 38/40, the rail is currently used only by tourist passenger trolleys in the summer.

Piers 38/40 are well serviced by access to I-95 (see Exhibit III-1). The on-ramp to I-95 south is located nine blocks south, and the off-ramp for I-95 traffic approaching from the south is located four blocks south. The off-ramp for traffic approaching from the north on I-95 (and from I-676) is located three blocks north of Piers 38/40. The on-ramp to I-676 is located at that same intersection. Four blocks further north on Christopher Columbus Boulevard is the on-ramp to I-95 North.

Christian Street and Washington Avenue provide access between Columbus Boulevard and city streets west of I-95. Since most east-west streets are cut-off at I-95, Christian Street and Washington Avenue carry significant traffic volume. Washington Avenue provides two lanes in each direction and Christian Street provides one lane in each direction.

The Pennsylvania Department of Transportation is currently constructing an improvement to Delaware Avenue from Reed Street to Race Street which includes completion of the "Riverwalk" pedestrian route, some revisions to median openings, and an improved traffic signal system.

Location Map
Highway Access to PRPA Piers 38-40
Christopher Columbus Boulevard
Piers 38/40 Reuse Study
CITY OF PHILADELPHIA, PENNSYLVANIA

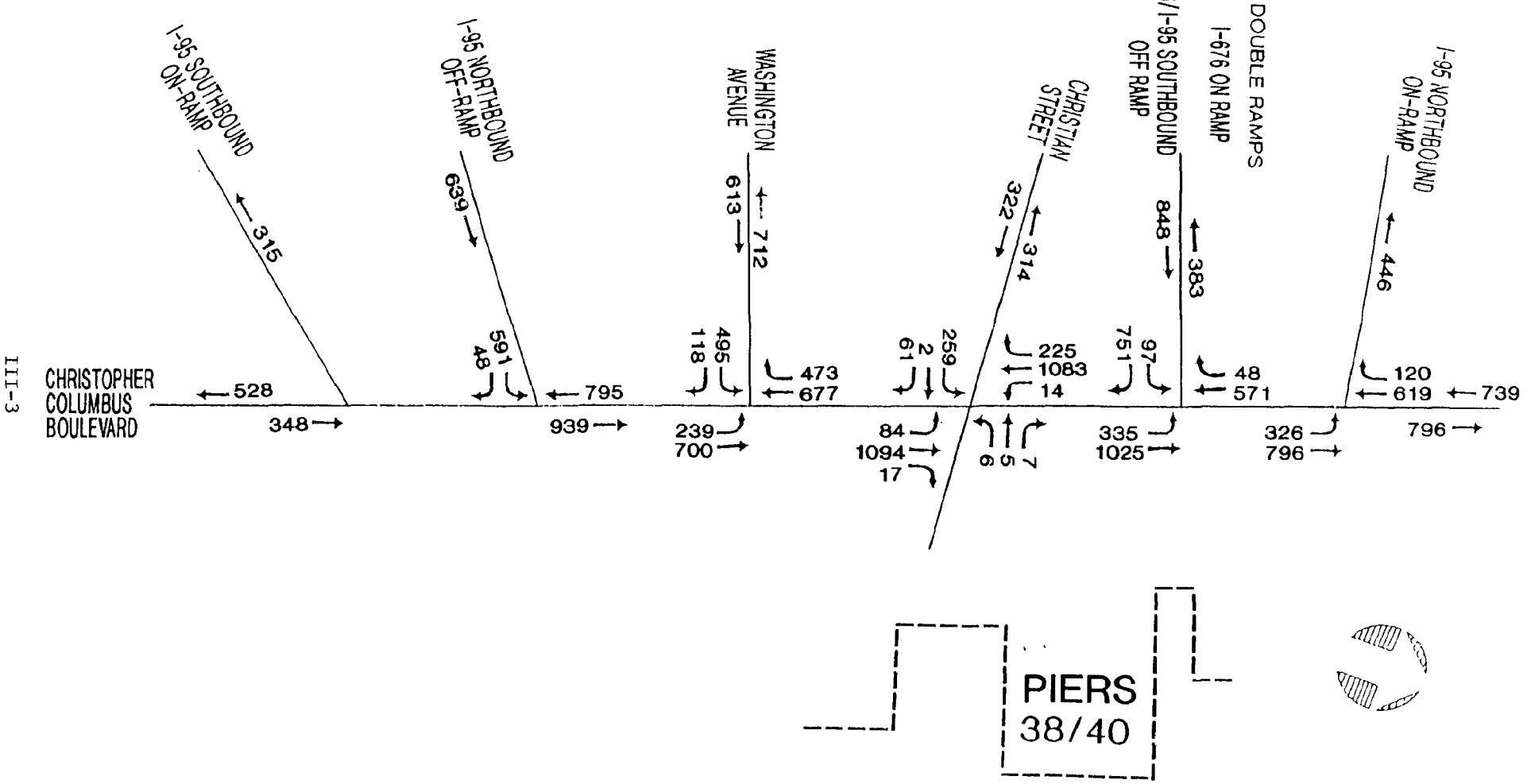


Existing Morning Peak Hour Traffic Volumes- 7:30 to 8:30 AM

Christopher Columbus Boulevard

Piers 38/40 Reuse Study

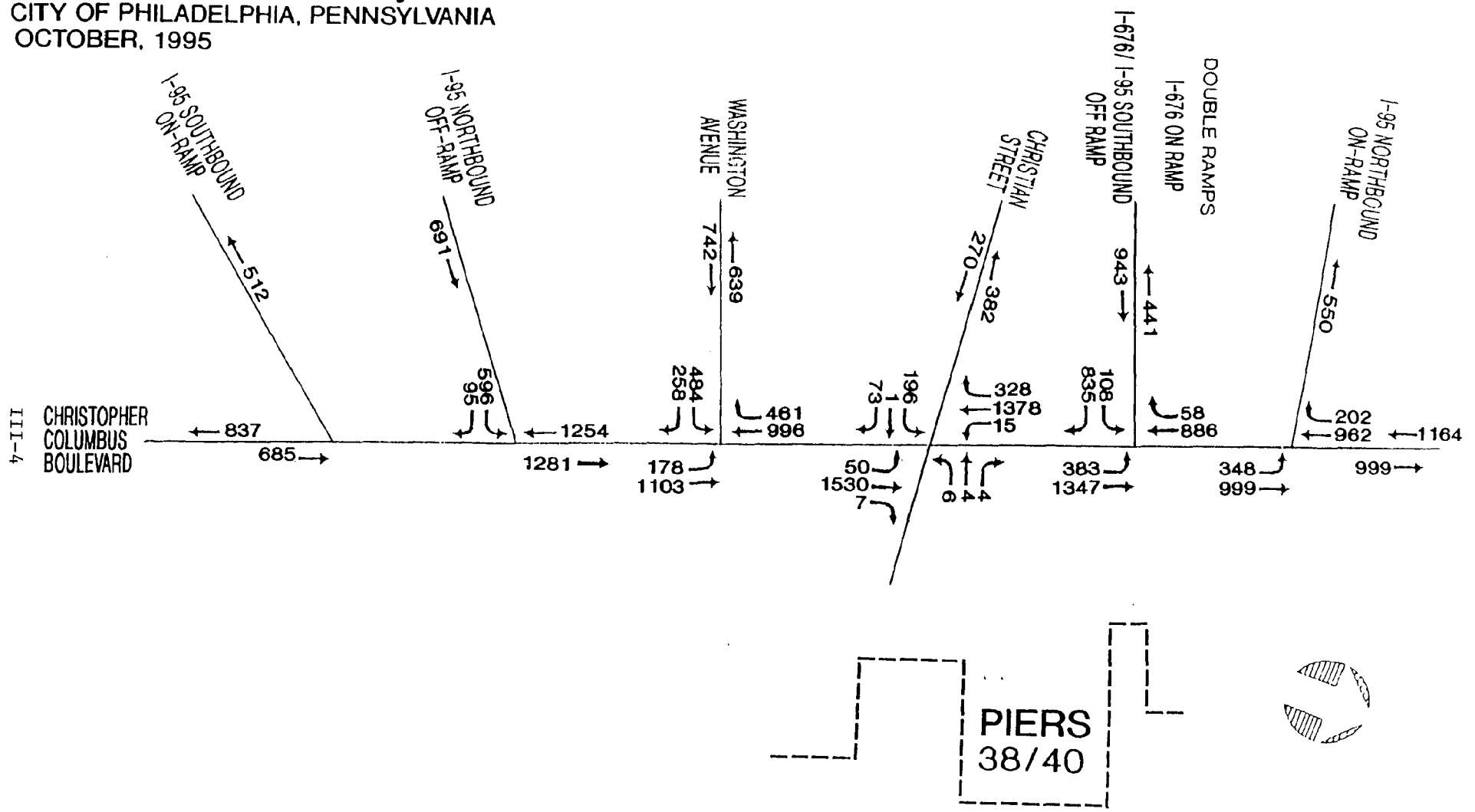
CITY OF PHILADELPHIA, PENNSYLVANIA
OCTOBER, 1995



Existing Evening Peak Hour Traffic Volumes- 4:30 to 5:30 PM

Christopher Columbus Boulevard
Piers 38/40 Reuse Study

CITY OF PHILADELPHIA, PENNSYLVANIA
OCTOBER, 1995



1.1 Existing Traffic Volumes

Manual turning movement traffic counts were conducted in October 1995 during the morning and evening peak traffic periods at six intersections on Christopher Columbus Boulevard. They include:

Christian Street/Piers 38/40 driveway
Washington Avenue
I-95 northbound off-ramp
I-95 southbound on-ramp
I-676, I-95 southbound off-ramp/I-676 on-ramp
I-95 northbound on-ramp

The peak hour volumes are illustrated on Exhibit III-2 for the morning peak hour from 7:30 A.M. to 8:30 A.M. and on Exhibit III-3 for the evening peak hour from 4:30 P.M. to 5:30 P.M.

The area at Piers 38/40 is the most heavily travelled section of Christopher Columbus Boulevard, as indicated by Table III-I below. It is interesting to note that current traffic volumes are similar to counts taken in November 1993 by Urban Engineers.

TABLE III-I
TWO-WAY TRAFFIC VOLUME ON CHRISTOPHER COLUMBUS BOULEVARD

Section	A.M. Peak Hour Volume	P.M. Peak Hour Volume
South of I-95 southbound on-ramp	876	1522
I-95 southbound on-ramp to I-95 northbound off-ramp	1191	2034
I-95 northbound off-ramp to Washington Avenue	1734	2535
Washington Avenue to Christian Street	2345	3044
Christian Street to Double Ramps	2682	3451
Double ramps to I-95 northbound on-ramp	1741	2291
North of I-95 northbound on-ramp	1535	2163

Evening peak hour volumes on Columbus Boulevard in the vicinity of Piers 38/40 are about 30% higher than morning peak hour volumes. Therefore, the evening peak hour was analyzed for purposes of determining traffic impacts of alternative developments.

1.2 Existing Levels of Service

Volume capacity analysis was performed for the six study intersections using the evening peak hour traffic volumes. It was assumed that roadway conditions and traffic signal operation will be in accordance with plans for the PennDOT Delaware Avenue improvement project. Resulting levels of service are shown in Exhibit III-4. As indicated, the existing roadway network operates generally at an acceptable level of service. The only location with an unsatisfactory level of service is the right turn exiting at the double ramp which is expected to operate at Level of Service 'E' during the evening peak hour.

1.3 Existing Traffic Generated by Piers 38/40

The current use of Piers 38/40 is warehousing of paper products. Most is trucked in from PRPA Piers 78/80 at Snyder Avenue. The paper departs via either truck or rail. The traffic counts conducted in October, 1995 at the Piers 38/40 driveway indicated that 30 to 50 vehicles use the driveway hourly during hours of operation (total entering and exiting), 20% of driveway traffic is tractor trailers.

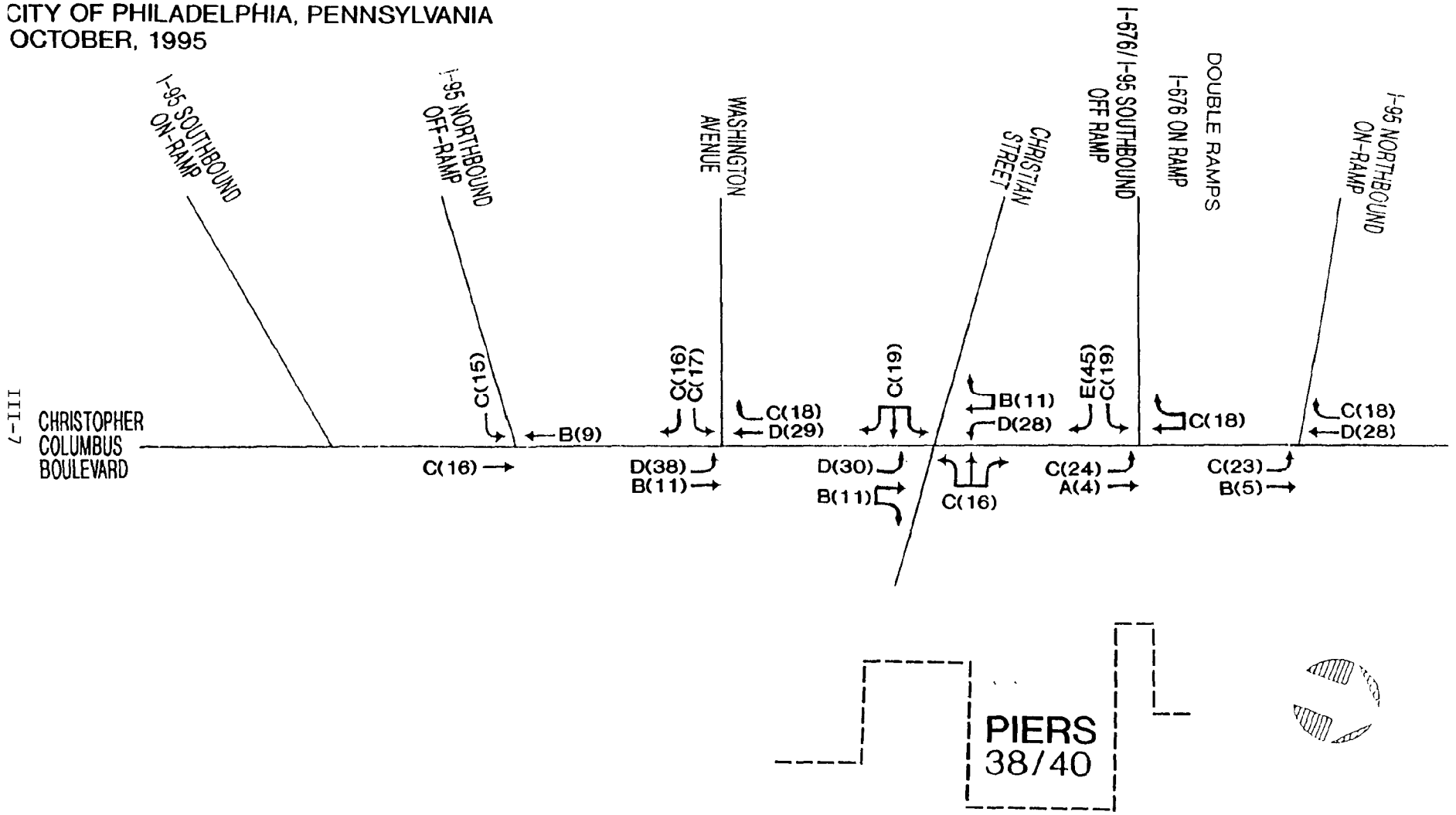
Rail service to Piers 38/40 approaches from the south. Trains must travel north past Piers 38/40 and then reverse into the siding. Likewise, when exiting, the train turns right (north), travels past the switch, and then reverses to travel south on the main track. During these entering and existing movements, northbound traffic on Delaware Avenue is stopped. Southbound traffic on Delaware Avenue is not affected. Three railroads have operating rights on the tracks --- CSX, Conrail, and Delaware and Hudson. Currently, Conrail provides most of the rail transport for Piers 38/40.

All trains pass through the South Philadelphia rail yard. According to the Yardmaster, because of scheduling requirements of service to Snyder Avenue, the yard will allow only one trip per day to Piers 38/40 for each of the three railroads. They are scheduled as follows: CSX - 11:00 A.M. to 4:00 P.M.; Conrail - 6:00 P.M. to Midnight; D&H - 11:00 P.M. to 4:00 A.M. Trains operate five days per week year round. On occasion, weekend runs are made but these are not regular runs. The yardmaster indicated that any increase in demand would be met by adding cars to the train rather than allowing a second train per day.

Under current conditions, one train per day with seven to ten cars travels to Piers 38/40. This results in two periods of traffic closure on northbound Delaware Avenue (one for entering, one for exiting) sometime between 6:00 P.M. and Midnight.

Existing Evening Peak Hour Levels of Service
Christopher Columbus Boulevard
Piers 38/40 Reuse Study

CITY OF PHILADELPHIA, PENNSYLVANIA
OCTOBER, 1995



2. Traffic Impact of Wood Pulp Scenario

Under this scenario, Piers 38/40 would warehouse wood pulp which would arrive by ship directly at the pier. Truck movements between Piers 38/40 and Piers 78/80 which occur today would be eliminated.

It is anticipated that most of the pulp would depart by rail. The estimated volume is 200,000 tons annually.

With five day per week operation (250 days per year), about 800 tons of pulp would be moved on an average day. Assuming that a rail car holds 70 tons of pulp, an average of 11 to 12 carloads per day would be transported.

As long as the pier operator used a single rail carrier, the number of trains per day would be one train, i.e., the same number of trains as under current conditions. This is because of the restriction on scheduling imposed by the South Philadelphia yard. However, the increased train length might result in additional closures for switching movements to move all of the cars within the pier, since the siding track length within the pier (440 feet) can accommodate only about 8 cars.

Even so, the traffic impact of using Piers 38/40 for pulp storage is negligible if rail movements continue to be made on week nights, because the traffic volume on Delaware Avenue is much lower after 7:00 PM.

3. Traffic Impact of Passenger Cruise Ship Terminal Scenario

This scenario calls for a passenger terminal that would accommodate a cruise ship of up to 1100 passengers. Approximately 18 sailings per year are assumed, with a six to seven day cruise duration.

3.1 Trip Generation of Cruise Ship Terminal

Traffic related to a cruise ship consists of several components --- the passengers, the staff, and service and provisioning (fuel, food, etc). It is assumed that service and provisioning will either occur elsewhere, or if at Piers 38/40 it will occur well before passengers begin to arrive.

Regarding the staff, most of the employees on the ship itself are foreign. They remain on the ship until their tour of duty is over. About five to ten percent of this staff may turn over per ship call and are shuttled between the airport and the ship terminal by bus.

Only a small percentage of the staff, including the staff of the passenger terminal itself, will live in the Philadelphia area and generate driving trips and parking demand. Employees are likely to arrive before and depart after the pasengers so that their trips will not occur during the same time period as passengers.

The passenger arrivals and departures will generate most of the traffic associated with a cruise ship terminal. In order to convert passenger volume to vehicle trips, the following assumptions are made regarding mode split and vehicle occupancy.

Assume 1100 passengers, maximum

50% Auto (drive) at two passengers per vehicle
25% Auto (drop-off) or taxi at two passengers per vehicle
25% Shuttle at six passengers per vehicle

Average vehicle occupancy rate = 3.0 persons per vehicle.

It is recognized that the number of passengers who drive to the terminal and park will be directly related to the availability, cost, and security of long term parking. It will also be related to the availability and cost of shuttle service, which might be arranged by travel agents as part of the travel package. However, based on the stated assumptions, the estimated number of trips generated by passengers is as follows:

	Inbound	Outbound	Total
Ship Departure	460	180	640
Ship Arrival	180	460	640

Passenger trips are likely to be spread over a two to three hour period prior to ship departure, but may be concentrated within an hour or 90 minutes upon the ship's arrival back in Philadelphia.

The projected peak hour trips generated by a cruise terminal are illustrated on Exhibit III-5. The projection assumes that there is long term parking on Piers 38/40. Parking is discussed further below.

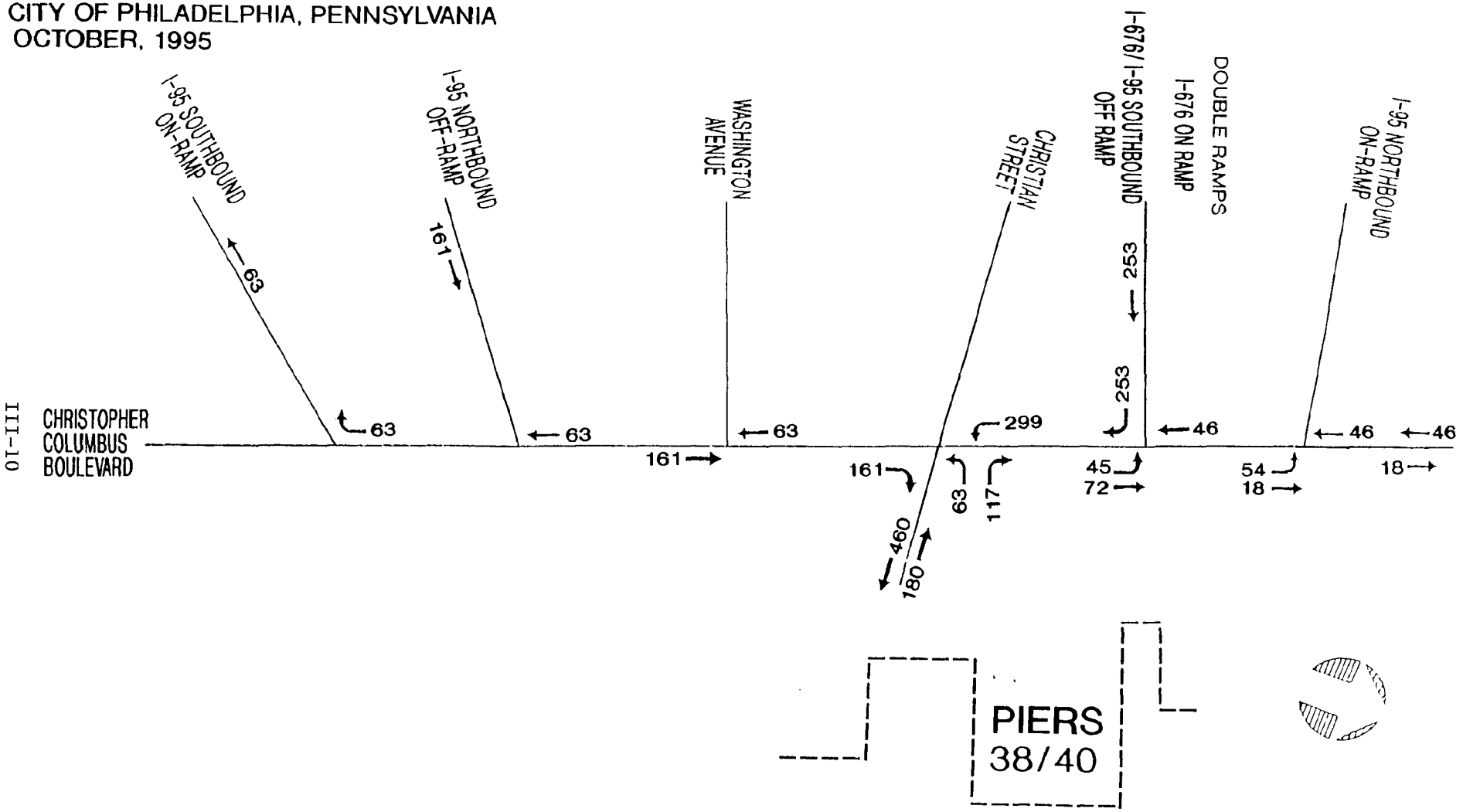
Volume/capacity analysis of area intersections with the addition of passenger cruise terminal traffic shows that, in general, sufficient roadway capacity exists on the external streets. This scenario can be accommodated with good levels of service, as long as cruises arrive and depart on a weekend, or midday on a weekday.

Areas of concern for this scenario are 1) parking, and 2) internal vehicle circulation for drop-off and pickup.

3.2 Parking for Cruise Ship Terminal

The estimated parking demand for the cruise terminal scenario is 300 spaces, given the previous assumptions on mode split. As noted earlier, this mode split is probably flexible depending on the availability of parking. Security is also extremely important to any long term parking at the waterfront. Although there are some public parking lots north of this area, none provides long term parking with 24-hour security. Parking might be handled in several ways:

Additional Peak Hour Traffic Volumes Generated by Cruise Terminal
Christopher Columbus Boulevard
Piers 38/40 Reuse Study
CITY OF PHILADELPHIA, PENNSYLVANIA
OCTOBER, 1995



Parking within the pier itself would have the advantage of being convenient and secure. The disadvantage is that the space would be used only 16-18 weeks out of the year. Therefore providing parking on the pier is not an option and parking must be provided offsite.

Off-site parking requires that shuttle transportation to the cruise terminal be available. It is most feasible if there is one designated lot. This allows clear directions to be given to the traveller in advance, and concentrates passengers for shuttle service. Since cruises are scheduled, it may be possible to contract with an existing long term parking lot in the airport area to provide parking and shuttles to the cruise ship terminal, a 15-minute trip via I-95.

If long term parking is to be provided off site but close to the terminal, it should be located in the area between Tasker Street and Christian Street. This area provides convenient access via the I-95 ramps. In the area north of Christian Street, limited land and demand for parking for Penns Landing and South Street precludes a large long term parking lot.

Open lots do exist in the area south of Christian Street. However, this land is optioned to riverboat gaming interests. Approximately 2.5 to 3 acres would be needed to park 300 cars. The availability of land and the economic viability of providing a parking lot for use 18 weeks per year would need to be determined.

3.3 Internal Vehicle Circulation at Cruise Ship Terminal

The vehicle entrance to Piers 38/40 is at the southern end of Pier 40 at the signalized intersection of Delaware Avenue and Christian Street. The circulation for passenger drop-off for a cruise ship terminal would involve a counter clockwise movement with vehicles making a U-turn after the drop-off in order to return to the driveway to exit. This U-turn must accommodate buses; the outside radius for bus turns is 60 feet. Up to 250 vehicles per hour would utilize the drop-off/pickup zone, and these vehicles would be unloading or loading luggage. Vehicle stacking length of about 500 feet should be provided. The vehicle stacking, bypass of stacking, and U-turn capability would have to be provided either in the open pier between the two buildings, or in the area between Christopher Columbus Boulevard and the buildings.

4. Traffic Impact of Cocoa Bean Scenario

Cocoa beans currently are shipped in to Pier 84. Under this scenario, Piers 38/40 would be used to increase the import capacity. The cocoa beans would be trucked to Pier 84 for value-added work.

No rail transport is anticipated under this scenario. However, direct rail could occur, if manufacturers do not require super-sacked beans or bulk truck deliveries. For planning purposes, it is assumed that the maximum volume of beans to be trucked out of Piers 38/40 annually is 800,000 to 1,000,000

bags of 142 pounds each, or 57,000 to 71,000 tons annually. This is the equivalent of about 3,000 annual truckloads or an average of 12 truckloads per day.

The cocoa bean scenario results in reduced highway traffic compared to existing conditions. Even if rail moves occurred, the rail move would not likely exceed the single daily rail trip.

IV. CONCEPTUAL DESIGN FOR MARKET RE-USE

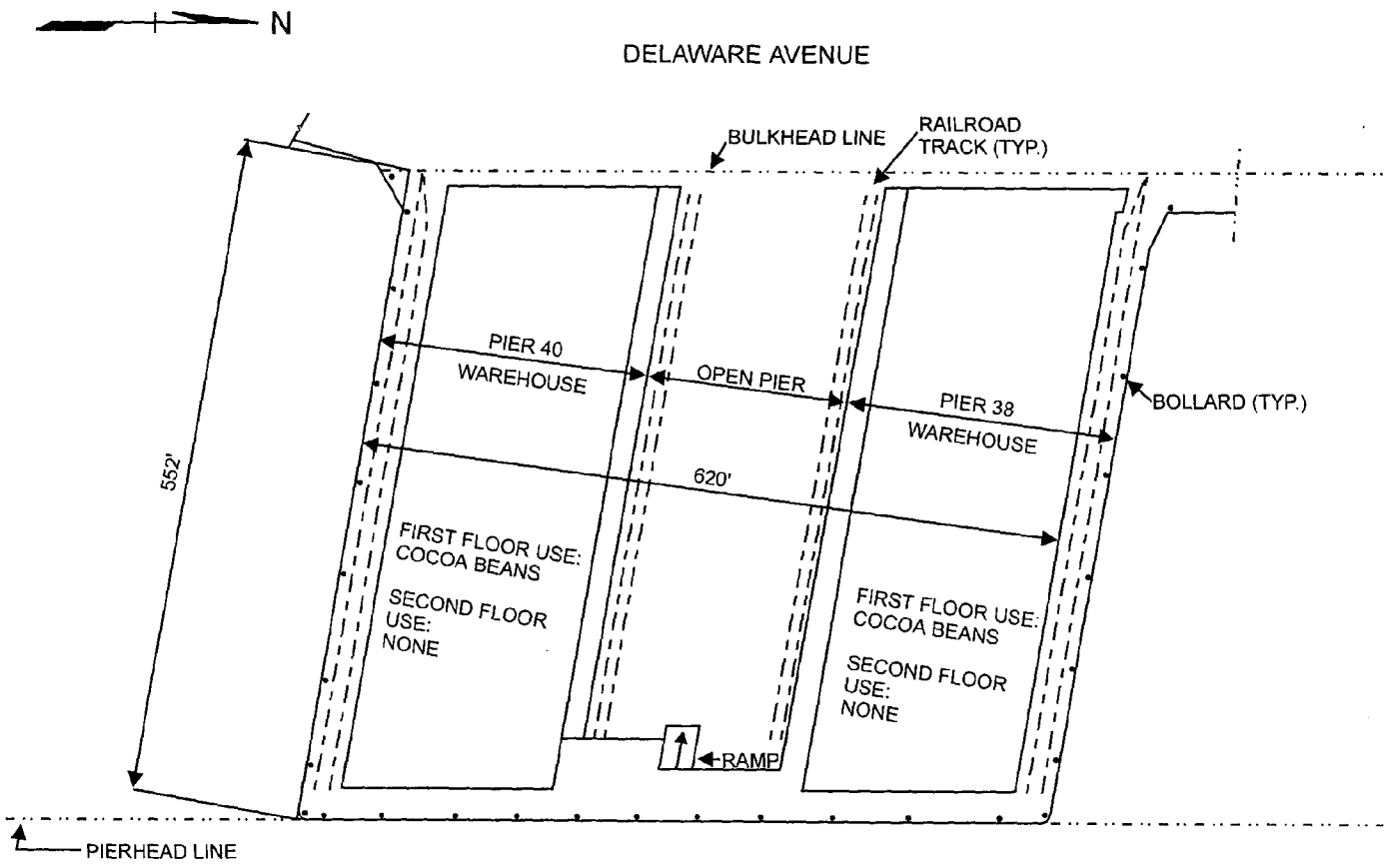
Based on the market analysis, there are three viable uses for this facility: pulp paper; cocoa beans; and cruise ship terminal and/or London Metals Exchange. Of these three uses the pulp paper and cruise terminal/London Metals Exchange use could be combined into one concurrent use whereby the pulp paper facility is located on the first floor of the warehouse and the cruise terminal and/or London Metals Exchange located above. That is, the first floor of each building will be used for the pulp paper facility and the second floor of one building could be used for a cruise ship terminal and the second floor of the other building could be used for the London Metals Exchange. The cocoa bean facility will be a stand alone use. Therefore, there will be only two conceptual designs delineated for this study plan.

1. Cocoa Bean Facility

Cocoa beans arrive at the pier in small cargo vessels. Because of the limited draft along the upstream and downstream sides of the pier structures it is assumed for this report that the vessels will berth along the marginal wharf.

Food quality upgrade of the facility will be required. Assuming this facility will be upgraded in a manner similar to that at Pier 84, the following amenities will be required: 1) a system of plastic strip partitions to segregate individual areas from each other; 2) an in-house fogging system to limit insect growth; 3) the interior steel must be painted (previous experience indicates that there will be the need for lead paint removal); 4) a active ventilation system which can be accommodated by installation of fans into replacement wall panels. (No roof ventilators were required for the Pier 84 renovations); and 5) seal and level the floor with a heavy duty epoxy.

Cocoa beans are shipped in small cargo vessels and come packed in bags which are paletted with 25 bags per pallet. Each bag weighs about 140 pounds and the pallets are usually stacked 4 high. The footprint of a pallet is 6' x 4'6". The pallet weighs 1000 pounds. Therefore, the load is 140 lbs. x 25 bags x 4 high = 14,000 pounds plus 4 pallets at 1000 pounds per pallet, = 18,000 pounds per (6' x 4.5' = 27 sf) 27 square feet = 666.67 psf. This exceeds the design allowable live load of the first floor of the buildings on Piers 38 and 40 by 33%. Stacking the pallets only 3 high produces a load of 500 psf which is the design allowable live load of the first floor. It should be stressed that the live load capacity should be reevaluated based on a structural investigation of existing conditions before assuming that the design live load is appropriate for the structure in its current condition. Therefore, the user should be informed of the restriction that they may not stack the pallets more than 3 high if no limitations to the allowable loads are found in the structural analysis. The allowable live load should be posted inside the building to prevent overstressing the floor. The entire cocoa bean operation will be limited to the first floor of each pier structure. A plan of the proposed cocoa bean facility is shown in Exhibit IV-1.



PLAN
N.T.S.

COCOA BEANS
PIERS 38-40 REUSE PLAN
PHILADELPHIA REGIONAL PORT AUTHORITY
DECEMBER 1995 EXHIBIT IV-1

2. Pulp Paper/Cruise Terminal/London Metals Exchange Facility

2.1 Pulp Paper Facility

Pulp arrives at the pier in cargo vessels requiring a 38 foot draft. Because of the limited draft along the upstream and downstream sides of the pier structures it is assumed for this report that the vessels will berth along the marginal wharf.

Unloading of the cargo vessels requires 40 feet free for the swing of the ship's crane. The current marginal wharf is only 18 feet deep, therefore, it will be necessary to remove a portion of the end of the building to provide the required room for the ship's crane to operate. This is possible because the building is a steel framed structure which is designed and built in bays. The building can be shortened along structural bay lines and reconstructed by replacing, in the new end walls, the structural components which were removed in the old ones and making the proper connections. Additionally, it is desired to maintain the existing storage area within the warehouse. Modifications required to maintain the existing square footage of the building could include constructing a lean-to type pre-engineered metal building on the exterior (non open pier side) of each building to provide the expansion space. It is preferable to have a 25 foot high opening into the warehouse for moving the cargo inside. Since the clear height of the first floor of the building is only 22 feet, it is not possible to accommodate a 25 foot tall overhead door opening. The overhead door opening will be limited to under 20 feet depending on the manufacturer's specifications because of hardware and installation requirements at the top of the overhead door. The overhead doors at Pier 80, which is currently being used as a pulp paper facility, are 18 feet wide by 18 feet high and function adequately.

Pulp paper arrives unitized. The bales are 32" x 32" x 68" high and weigh up to 560 pounds each. They are traditionally grouped in 8 bales (4 high by 2 across) creating a unit which could weigh up to 4500 pounds. If the bales are stacked 1 high, the weight is 4500 pounds per 5'-4" x 2'-8" = 14.22 square feet or 315 psf which is less than the design allowable live load on the existing floor structure. Once again, it should be reiterated that the design live load may not be the current allowable live load due to structural deterioration, and that further investigation is required to confirm the appropriate allowable live load for the structure. Either way, the user could not stack the bales because of floor load limitations. Additionally, because the clear height of the first floor is approximately 22 feet, load limitations should be posted and enforced to protect the structural integrity of the building.

2.2 Cruise Ship Terminal

Cruise ships are limited in size by the Walt Whitman Bridge, however, the average draft of a 1000 passenger ship is greater than 20 feet. Therefore, because of the limited draft along the upstream and downstream sides of the pier structures it is assumed for this report that the cruise ships will berth along the marginal wharf.

The vessels forecasted to frequent Piers 38 and 40 include Bermuda (9 calls per year) and fall foliage (9 calls per year) and assume up to 1,000 passengers per vessel. There are no established criteria

for area requirements for cruise terminals, however, the rule of thumb is to allow for 20 square feet per passenger. Assuming that the largest vessel to dock at Pier 40 has a capacity of 1,000 passengers, the required square footage of the terminal would be (20 x 1000 = 20,000) 20,000 square feet. The warehouse area is much larger than this, so there is more than adequate space for the cruise terminal. (Based on passenger handling requirements determined by the airline industry, the need to accommodate 1500 passengers would result in the following minimal requirements: a baggage area of 15,000 square feet, a departure area of 6,000 square feet and a ticket queuing area of 9,000 square feet.)

The cruise terminal will occupy the second floor of one of the two pier buildings. The second floor is desirable because the elevation of the access portals of cruise vessels averages about 25 feet above the water line. Utilizing the second floor makes access to and from the ship more comfortable for the passengers. This also helps to clear the wharf area for cargo and baggage operations. The design live load capacity of the second floor of the buildings is 240 pounds per square foot, and should be posted and enforced in the cargo handling areas.

Improvements to the structure will include a passenger elevator, freight elevator and exterior sheltered stairway to access the second floor, restrooms for passengers, a passenger loading bridge, upgrades to accommodate baggage handling activities, and general architectural amenities to develop a passenger terminal including upgrades to provide access in accordance with ADA recommendations. Photographs of existing cruise terminal passenger loading bridges have been included to provide an example of this piece of equipment.

Additional improvements will include constructing a passenger drop-off/pick-up area and perhaps some parking in the area of the open pier.

2.3 London Metals Exchange

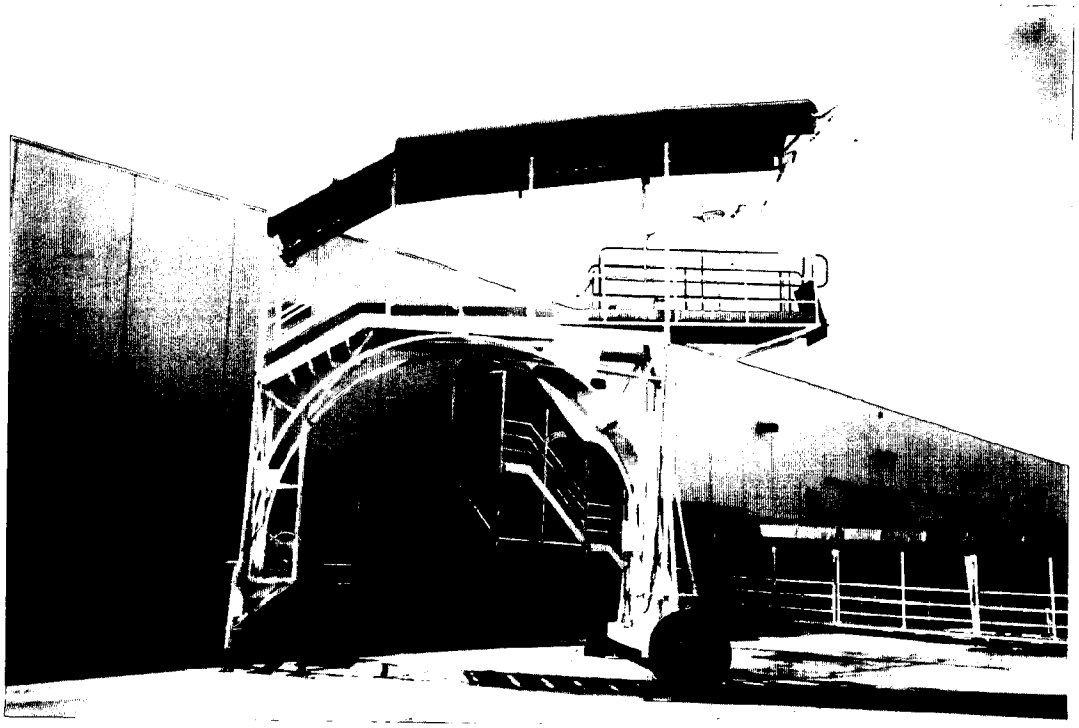
Based on the information developed during the market analysis phase of this study, there is no special remediation required for the second floor of either warehouse to accommodate the London Metals Exchange. It would be necessary to limit the live loads to 240 pounds per square foot or less as determined by structural analysis.

A plan of the pulp paper/cruise terminal/London Metals Exchange is shown in Exhibit IV-2.

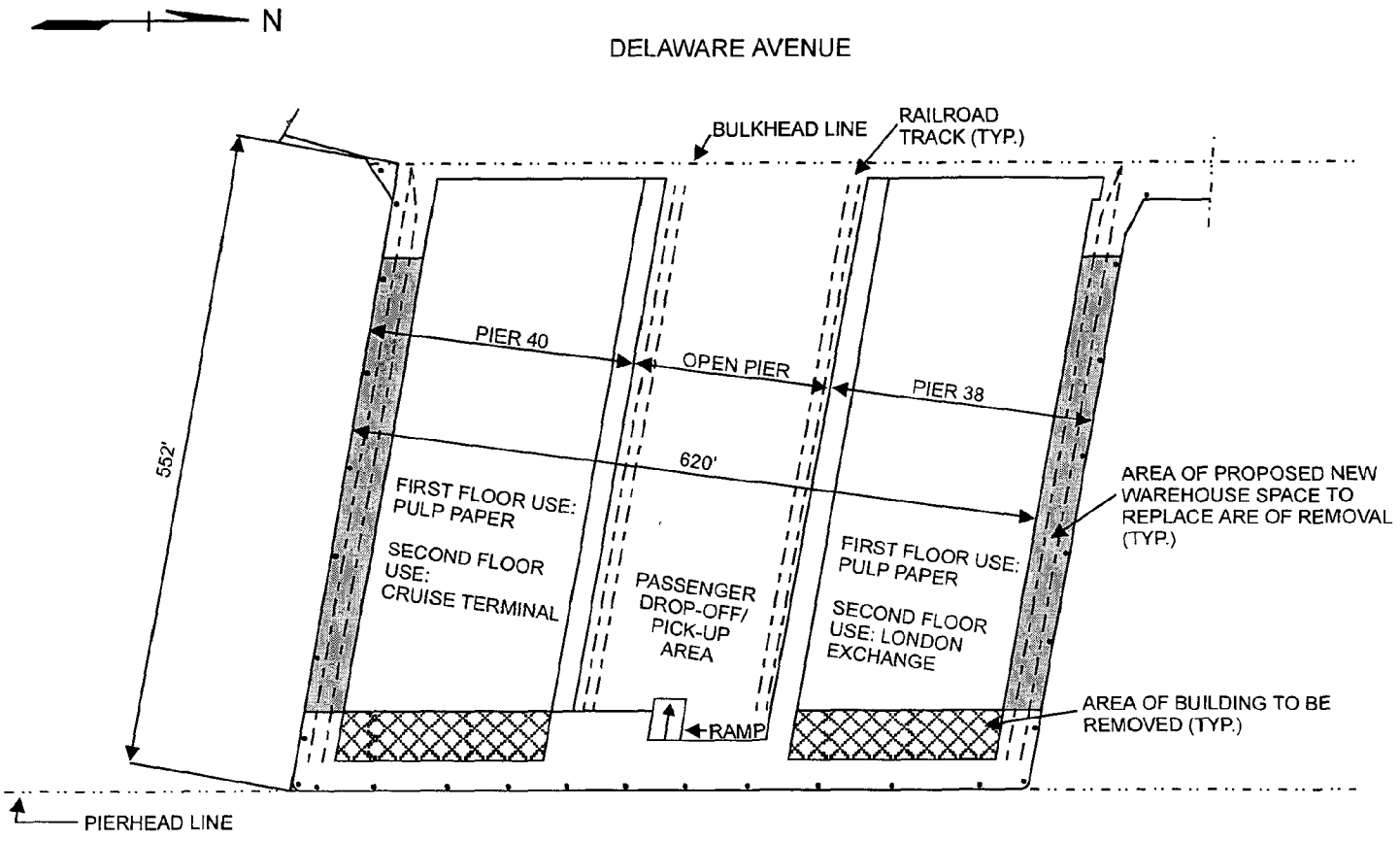
3. Cost Estimates

Complete cost estimates have been prepared for each of the two re-use options. These costs include the base construction cost to upgrade the buildings for compliance with local codes and standards in addition to the special requirements of each individual re-use. These costs are to be used as ballpark estimates and do not reflect specific costs for specific construction work. The total estimated cost to upgrade the Pier 38 & 40 site for re-use as a combination cocoa bean facility/cruise terminal/London Metals Exchange would be $7,098,000.00. The total estimated cost to upgrade the

Typical Passenger Loading Bridge



Typical Passenger Loading Bridge



PLAN
N.T.S.

PULP PAPER/CRUISE TERMINAL/LONDON METALS EXCHANGE
PIERS 38-40 REUSE PLAN
PHILADELPHIA REGIONAL PORT AUTHORITY

DECEMBER 1995 EXHIBIT IV-2

Pier 38 and 40 site for re-use as a pulp paper facility is $6,713,000.00. Breakdowns of the individual components comprising the cost estimates follow as Exhibit IV-3 through IV-9.

EXHIBIT IV-3

Summary of Estimated Costs

General Building Requirements

Pier 38	$ 2,185,000.00
Pier 40	$ 1,770,000.00
Substructure *	$ 300,000.00
SubTotal	$ 4,255,000.00

Pulp Paper/Cruise Terminal/London Metals Exchange Facility

Pulp Paper	$ 1,160,000.00
Cruise Terminal	$ 500,000.00
London Metals Exchange	$ -
Sub Total	$ 1,660,000.00
Plus General Building	$ 4,255,000.00
Contingency @ 20%	$ 1,183,000.00
Total Pulp Paper Alternative	**$ 7,098,000.00**

Cocoa Bean Facility

Cocoa Bean	$ 1,375,000.00
Plus General Building	$ 4,255,000.00
Contingency @ 20%	$ 1,083,000.00
Total Cocoa Bean Alternative	**$ 6,713,000.00**

* Does not include an estimate for possible additional structural rehabilitation

EXHIBIT IV-4

Pier 38 (estimate prepared by O'Donnell & Naccarato, Inc.)

1.	Upgrade doors to conform to fire rating direction of swing and proper hardware.	$ 35,000.00
2.	Demolish obstructing walls in stair tower as required for unimpeded exit.	$ 5,000.00
3.	Demolish barricade in southwest and northwest stair towers.	$ 5,000.00
4.	Provide illuminated signs and lighting for exit doors with emergency battery pack.	$ 25,000.00
5.	Provide emergency generator and extend circuits to first level lights to provide emergency lighting within pedestrian paths in the warehouse area.	$ 40,000.00
6.	New roof.	$ 130,000.00
7.	Remove cargo mast, clean and paint exterior.	$ 360,000.00
8.	New window panels.	$ 50,000.00
9.	Replace 5 first floor overhead doors.	$ 50,000.00
10.	Remove second floor doors and seal permanently.	$ 70,000.00
11.	Sawcut and caulk vertical control joints at east & west elevation concrete sidewalks.	$ 30,000.00
12.	Remove all loose, deteriorated concrete from east and west elevations. Repair to original condition and paint.	$ 80,000.00
13.	New sprinkler system.	$ 700,000.00
14.	Repair seawall.	$ 230,000.00
15.	Repair parking lot, place asphalt overlay and repair/replace concrete walks.	$ 150,000.00
16.	Replace main electrical service distribution equipment.	$ 75,000.00
17.	Install mechanical ventilation system (depending on future use).	$ 60,000.00
18.	Provide direct exit discharge from exit stair ways above east side.	$ 20,000.00
19.	Fully enclose existing stair tower to conform to present code requirements and create rated exit corridor leading from bottom of mezzanine stair to existing exit.	$ 30,000.00
20.	Provide one hour rated shaft enclosure at elevator and other floor openings between the first and second floors or close off floor opening not being utilized.	$ 20,000.00
21.	Upgrade interior stair enclosures to conform with fire 1 hour separation assemblies at west side.	$ 20,000.00
	Total	$2,185,000.00
	TOTAL PIER 38	**$2.2 Million**

* Items 1-5, 14, 16-21 include 15% mark-up for consultant design and construction management fees.

EXHIBIT IV-5

Pier 40 (estimate prepared by O'Donnell & Naccarato, Inc.)

1. Upgrade doors to conform to fire rating direction of swing and proper hardware.	$	35,000.00
2. Provide illuminated signs and lighting for exit doors with emergency battery pack.	$	5,000.00
3. Provide emergency generator and extend circuits to first level lights to provide emergency lighting within pedestrian paths in the warehouse area.	$	25,000.00
4. New roof.	$	130,000.00
5. Remove cargo mast, clean and paint exterior.	$	360,000.00
6. New window panels.	$	50,000.00
7. Replace 5 first floor overhead doors.	$	50,000.00
8. Remove second floor doors and seal permanently.	$	70,000.00
9. Sawcut and caulk vertical control joints at east & west elevation concrete sidewalks.	$	30,000.00
10. Remove all loose, deteriorated concrete from east and west elevations. Repair to original condition and paint.	$	80,000.00
11. New sprinkler system.	$	700,000.00
12. Replace main electrical service distribution equipment.	$	75,000.00
13. Install mechanical ventilation system (depending on future use).	$	60,000.00
14. Provide direct exit discharge from exit stairways along east side.	$	25,000.00
15. Upgrade means of egress to mezzanine to conform to present code requirements.	$	30,000.00
16. Upgrade interior stair enclosure to conform with fire 1 hour separation assemblies. at west side.	$	20,000.00
17. Provide one hour rated shaft enclosure at elevator and other floor openings between the first and second floors or close off floor openings not in use.	$	20,000.00
	$	20,000.00
Total	$	1,770,000.00
TOTAL PIER 40		**$1.8 Million**

EXHIBIT IV-6

Substructure

Repairs to Substructure*

1. Replace 34 piles	$	50,000.00
2. Repair 100' x 100' area of timber decking and repave	$	200,000.00
3. Replace fender system along marginal wharf	$	50,000.00
Total	$	300,000.00

*These costs do not reflect an estimate for possible additional substructure or building structure remediation

EXHIBIT IV-7

Cocoa Facility

1. Coat floors with epoxy	$ 250,000.00
2. Remove lead paint and repaint	$ 650,000.00
3. Install plastic partitions	$ 125,000.00
4. Install fogging system	$ 200,000.00
5. Active ventilation system	$ 150,000.00
Total	$ 1,375,000.00

EXHIBIT IV-8

Pulp Facility

Structural Changes

1. Remove east end of each building.	$ 50,000.00
2. Build pre-fabricated building along side of building.	$ 400,000.00
3. Provide 18' tall by 18' wide overhead doors on eastern face of buildings.	$ 10,000.00
4. Rebuild facade with architectural details similar to existing.	$ 120,000.00
Total per building	$ 580,000.00

EXHIBIT IV-9

Cruise Terminal (20,000SF)

1. Provide passenger elevator to second floor.	$ 80,000.00
2. Provide freight elevator to second floor.	$ 100,000.00
3. Provide exterior sheltered stairway to second floor.	$ 70,000.00
4. Provide restrooms for passengers.	$ 50,000.00
5. Provide passenger loading bridge.	$ 100,000.00
6. Provide architectural amenities to develop a passenger terminal.	$ 50,000.00
7. Provide upgrades to accommodate baggage handling activities.	$ 50,000.00
Total	$ 500,000.00

V. FINANCIAL IMPLICATIONS

In the previous chapter, the costs for the re-use options were presented for the pulp operation as well as the combined use of Piers 38/40 as a cocoa bean terminal, cruise terminal and London Metals Exchange (LME) facility. To recap, the cost for modifying Piers 38/40 for use as a cocoa facility is estimated at $6.7 million, and the cost of the re-use option as a combined pulp, cruise ship, and LME facility is about $7.1 million.

In order to assess the financial feasibility of the recommended modifications for the two re-use alternatives, the debt service costs associated with the development costs of each option were estimated. Assuming a 20 year bond at 7% interest, the annual debt service cost for these two re-use options are:

- $633,660 for the cocoa bean facility development
- $613,365 for the pulp facility excluding the $500,000 cost of development of a cruise terminal. With full development of both a pulp facility and a passenger terminal (excluding the costs of developing parking facilities), the annual debt service is $670,001

In order to cover only the annual debt service (excluding maintenance and operating costs) for the modifications to handle the pulp, and excluding the cruise ship modifications, the PRPA would need to collect about $3.07 per ton of pulp, assuming an annual throughput of 200,000 tons. If the pulp were to double to 400,000 tons, the debt service cost per ton would be cut in half to about $1.50 per ton. By comparison, the annual total lease revenue received by the PRPA on current facilities handling paper ranges from $1.29/ton to $1.34 per ton, including the revenue received from the lease with the stevedore handling the paper at Pier 80. Based on the current lease structure for paper handled at PRPA facilities, it would appear that the charges required to cover only the annual debt service on the pulp re-use option, excluding the cruise ship modifications, will be prohibitive from a competitive situation. However, if the debt service is not covered by the operation, then it is questionable whether such a re-use option should be perused. One method of covering the annual debt service would be to charge a passenger facilities tax equal to the debt service on the combined use of the facility. However, this would amount to $33.84 per passenger, assuming 1100 passengers per cruise and 18 cruises per year.

With respect to cocoa beans, the annual debt service to modify Piers 38/40 to food quality is $633,660. Assuming this cost is allocated to the incremental cocoa bean tonnage -- 63,900 tons-- that could be identified as moving via the Port due to expanded on-dock storage, the annual debt service cost per ton of cocoa bean imports is $9.92. Such a rate would affect the competitive position of the Port of Philadelphia in handling the beans.

Finally, if the facility is used as a CFS operation, the $4.3 million baseline building improvements will still be required, even though no additional modifications will be necessary (assuming no

additional costs for substructure). The debt service costs to cover the $4.3 million is about $482,000 annually, which would require an assessment of $482 per container, assuming 1,000 containers were handled at the CFS operation for backhaul shipments to eastern Europe and Scandinavia. A charge of $482 per container would offset the advantage of a near dock CFS operation, and, hence, the CFS opportunity would be non-competitive.

Based on this financial analysis of the development costs associated with each re-use identified, it would appear that if Piers 38/40 were leased to a terminal operator, the cost per ton of the annual debt service would render the facility non-competitive. If a lease charge was also developed to cover annual maintenance costs, the Port's charges on a per ton basis would be prohibitive from a competitive standpoint. This analysis would suggest that neither of the re-use options makes economic sense because of the large amount of capital dollars required at Piers 38/40. The majority of these costs ($4.3 million) are not related to specific re-use modifications, but instead are the result of the $4.3 million needed to bring the facilities up to code, regardless of re-use. It is further emphasized that these costs do not include any estimate for possible additional substructure rehabilitation.

Due to the high cost of development, the PRPA could operate the facility, most likely as a pulp facility, and establish a wharfage, dockage, handling, and storage tariff to cover operating, maintenance and debt service costs. To operate the facility in the cocoa trade would not appear to make financial sense.

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 8555
Harrisburg, PA 17105-8555
January 11, 1996

717-787-2529

Bureau of Land and Water Conservation

Neil K. Christerson, Program Specialist
Coastal Programs Division - OCRM
SSMC4, Room 11209 (N/ORM 3)
1305 East-West Highway
Silver Spring, MD 20910

RE: DEP File No. CZ1:A(94)

Dear Neil:

Enclosed with this letter are two copies of the final report for the Piers 38/40 Reuse Plan (94PS.02). This project was completed with funds provided by a financial assistance award in the Coastal Zone Management Program for the fiscal year 1994.

Sincerely,

Robert S. Edwards

Robert S. Edwards
Environmental Planner II
Division of Coastal Programs

Enclosure

cor

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